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Editorial

Import Restrictions and the Radio Trade

No one would ever have expected that the impact of Mr Nash's import restrictions would be any less heavily felt by the radio industry than by many others that will be quite noticeably "hit". Indeed, it hardly took a prophet to predict some of the larger items that would be heavily restricted, if not completly prohibited, and already there has been talk in official circles indicating that local manufacture of some of these items would be viewed with favour. Main items under this heading are record-changers and players, and tape decks, while certain essential items like intermediate frequency transformers have also been mentioned in this connection.

There certainly seems little reason why the latter should not be produced here on a scale that meets the industry's full needs. Some manufacturers of receivers already make their own I.F. transformers, and the total requirement is so large, numerically, that it would seem eminently reasonable for them all to be made in this country, provided that the problem is tackled in a reasonable manner. In estimating whether local manufacture of a specific item is justified on economic grounds, one must obviously take into account not only the number required by the industry as a whole in one year, but also the number of manufacturers who propose to undertake their making. The point that should be made clear, both to the Government, and to all members of the manufacturing industry, is that the latter is, by overseas standards, still a small one. Thus, while it may be economic for a single factory to undertake the making of all the I.F. transformers (or record-changers or tape decks) for the whole New Zealand industry, it may be quite the reverse if each firm assembling radio sets proposes to make its own.

It seems to us that the re-imposition of import restrictions should be the signal for the members of the radio manufacturing industry to draw closer together, and to plan their activities on a communal basis. By this, we do not mean that all resources should be pooled, or that existing makers should lose their autonomous status. If that were to happen, it would be a disaster, particularly for the purchasing public; it should still be possible, however, for much closer co-operation between manufacturers to result only in good to them and to their buying public. In the last analysis it may never appear economic for tape decks, for instance, to be made here on a mass-production basis, but it would be a rash prophet who would dogmatize on such a question. Who can say, for example, that a co-operative factory for turning out record-changers and tape decks could not be established, or that once set up, it would not turn out to be a highly successful and economic unit? It may well be that the initially forced nature of such an undertaking could turn out to be a blessing in disguise. There is no *a priori* reason why New Zealand could not become world renowned for her manufacture of goods of this type, just as Switzerland has made the watch-making industry her own. This idea is perhaps a good deal more than a pipe-dream. It is only by bringing to reality such "impossible" ideas that new sources of national income are established.

In any event, there does seeem to be a good case for the drawing together of the somewhat loose bonds which hold our radio industry together, and the establishment of a co-operatively owned and operated component factory would seem a good and logical move, for all that it would be fraught with initial practical difficulty. If we MUST have Mr Nash and his import restrictions, then at least let us make the most of the conditions which between them they bring about.

GOODMANS

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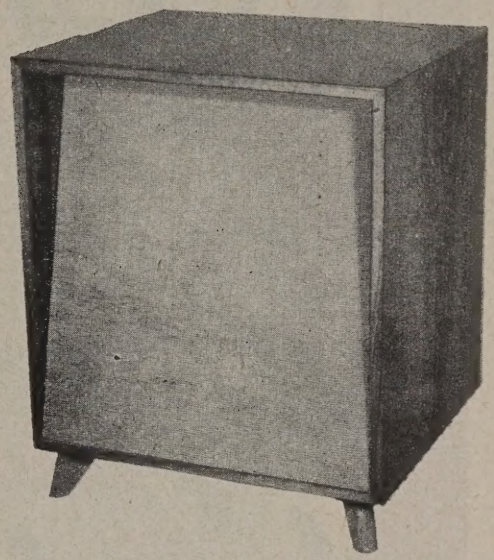
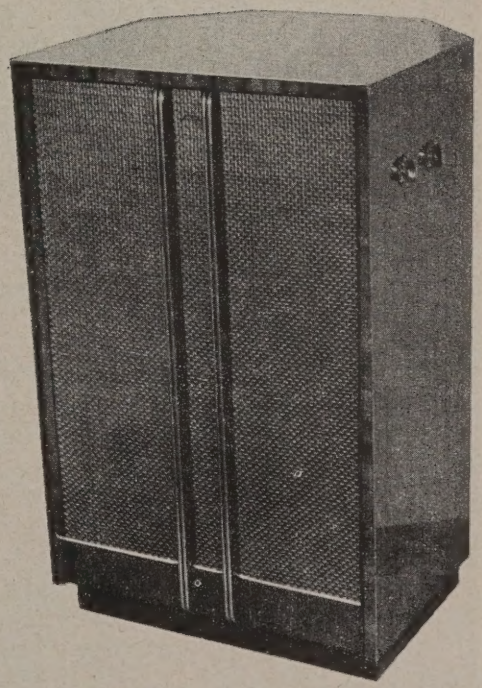


Finished in choice mahogany veneers with contrasting woven plastic fret.

The "315" REPRODUCER

is a complete complex loudspeaker system. It contains three loudspeaker units; a 12 in. bass unit of the direct radiator type, operating from 30 c/s. to 750 c/s.; a mid-range unit, pressure type, horn loaded, operating from 750 c/s. to 5 Kc/s.; and a treble unit, pressure type, horn loaded, operating from 5 Kc/s. to 16 Kc/s. The three units are fed by a double divider network, the mid-range and treble units are provided with constant impedance variable attenuators, calibrated in 2 decibel steps, enabling easy and accurate variation from level response to suit individual listening conditions and special requirements. The complete system is housed in a thick walled enclosure of exceptional rigidity; the bass chamber is loaded by an Acoustical Resistance Unit.



The "315" Reproducer is finished in distinctive sapele veneers in medium rosewood colour.

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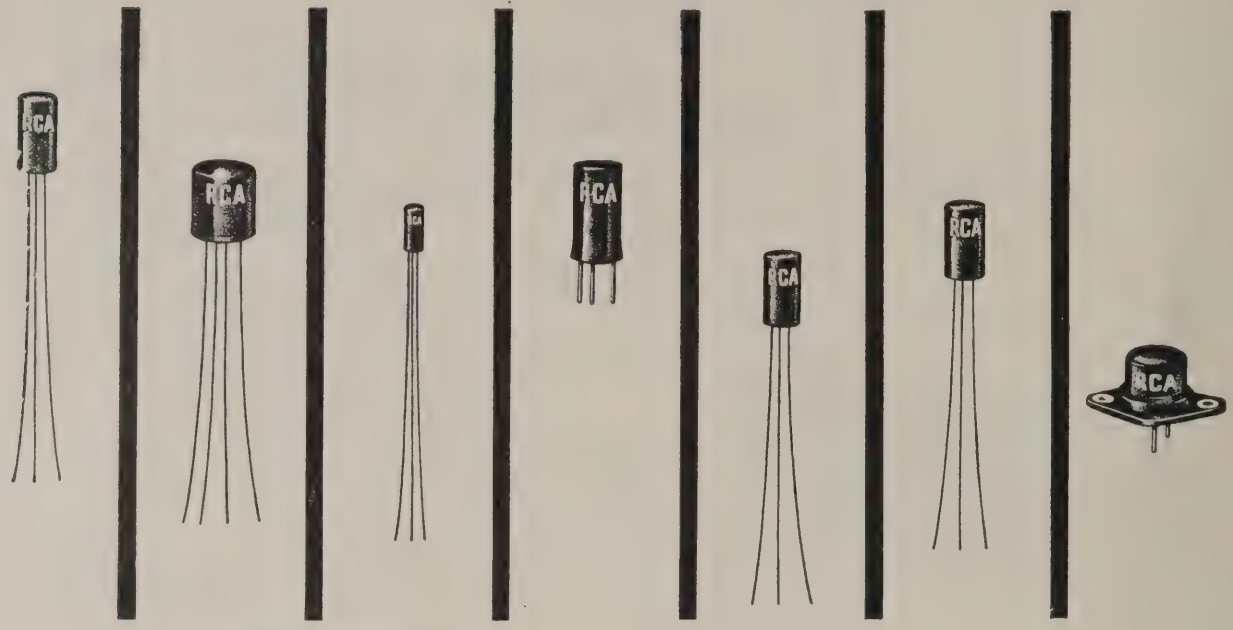
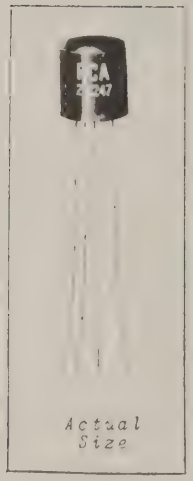


RCA Transistors and Semiconductor Diodes



Take the R.C.A.-2N247, a drift transistor of the germanium p-n-p type designed specifically for use as radio-frequency amplifier in entertainment-type receivers operating at frequencies covering the AM broadcast band and up into the short-wave bands.

Unique in design, the 2N247 utilizes R.C.A.'s alloy-junction technique, but features, for the first time, a base region in which the impurity distribution is very carefully controlled to produce a built-in accelerating field. This accelerating field which propels the charge carriers from emitter to collector is a feature not available in conventional transistor designs. As a result, the base resistance and the collector transition capacitance of this transistor are reduced.

These various features permit the design of radio-frequency amplifier circuits having high input-circuit efficiency, excellent operating stability, good automatic-gain-control capabilities over a wide range of input-signal levels, and good signal-to-noise ratio.

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Transistors

A MULTI-PURPOSE TRANSISTOR AUDIO AMPLIFIER

Described below is a general-purpose audio amplifier using transistors throughout, and powered from a 6-volt battery. It has a power output of just over 300 milliwatts, and though not in the "Hi-Fi" class, gives an excellent account of itself even when used for reproducing records through a high-class speaker system. It is this ideal for building into a portable receiver, or a portable gramophone. In addition, it can be used on the bench as a "hack" speaker amplifier for attaching, for testing purposes, to any device that needs audio amplification to make its output audible.

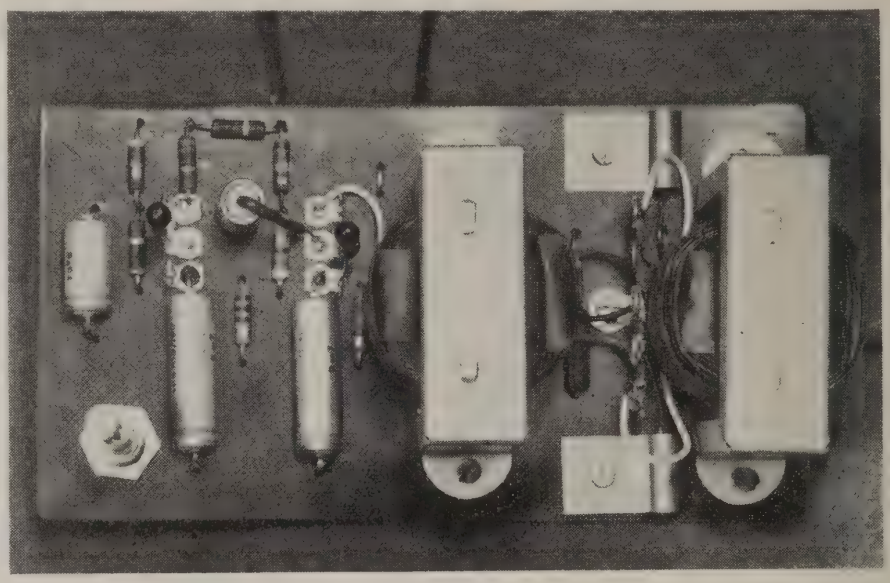


FIG. 1.—*Top view of the completed amplifier. Compare the actual components and their positions on the board with the circuit diagram on the opposite page.*

Introduction

It hardly needs to be emphasized that one of the prime purposese of a transistor amplifier at the present time is to enable those interested in electronic techniques to gain some experience with transistors, and at the same time to finish up with a built-up piece of equipment that is immediately useful. As this journal has been at some pains to point out, we would have preferred to present transistor circuits like this one much earlier in the piece, since transistors have been available for some time, and at quite reasonable prices, too. Unfortunately, this has not been possible (practically, at any rate) because in many applications, the use of transistors presupposes the availability of certain components without which the transistors themselves are very difficult to apply. Take the present example, for instance, viz. the building of a small transistor audio power amplifier. For this, at least one transformer is needed, and its characteristics are such that it is extremely unlikely that a transformer made for any other purpose could be made to fill the requirement. In other words, a specially made output transformer is essential.

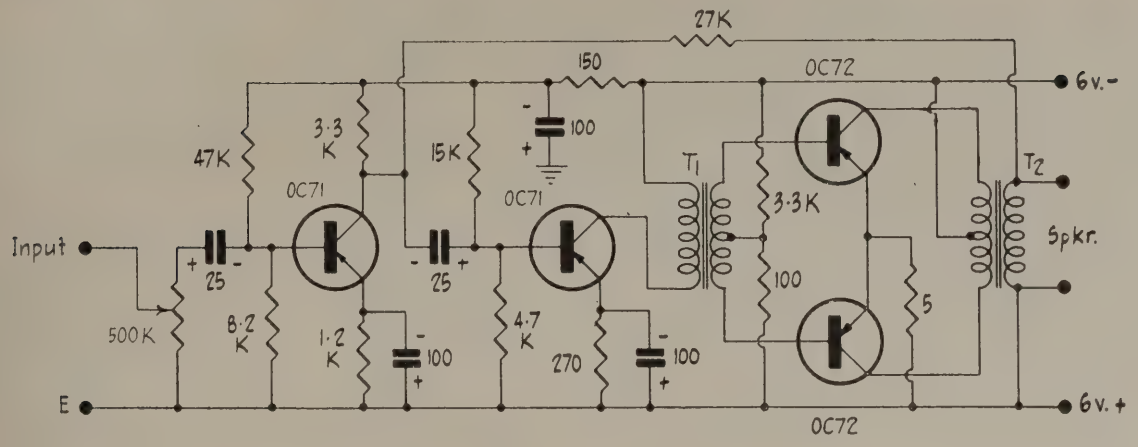
Further, since it is well-established practice to use transistors in Class B in the output stage of such an amplifier, ordinary practice once more dictates the use of a transformer-coupled driver stage, and here again a specially wound transformer is necessary.

Until very recently, none of our transformer manufacturers have placed on the market transformers designed for these applications, so that the lot of the would-be dabbler with transistors has been a hard one, unless he was fortunate enough, and persevering enough to design and build his own transformers. Accordingly, this journal has taken steps to have made a small quantity of transformers identical with those used in the prototype amplifier illustrated here, and these are available from our office for anyone who may want them.

Uses for a Small Transistor Amplifier

The amplifier to be described is built round a matched pair of OC72 transistors, powered from a six-volt battery. The designed power output is just over 300 milliwatts which, incidentally, is a good deal more than the same transistor types were originally rated to produce. This does not mean that they are being overrun, but is a consequence of the fact that since the type first appeared, its external form has been changed in such a way as to allow an increase in collector dissipation. This in turn means that a greater audio output can be obtained from the transistors.

For those who want a comparison with small valve amplifiers, it can be stated that a single 3S4 or DL92,



with an H.T. supply of 6$\frac{1}{2}$ volts will produce a power output of 125 milliwatts. From this, it can be seen that the output of the transistor amplifier is considerably greater than that of many valve-operated portable receivers. Those who have heard some of the currently available transistor portables, some of which use a pair of OC72 transistors under similar conditions to those obtaining in this amplifier, will hardly have failed to be struck by the large audio power output for a portable receiver. This, then, is the reason, and the amplifier this article describes makes an excellent one for inclusion in a portable receiver. If used in this way, the tuner portion can employ either valves or transistors, because although the former require a B battery, the drain on it is very slight, the high-consumption audio amplifier having been done away with.

Incidentally, the battery-portable gramophones that have found their way on to the commercial market almost invariably use an audio amplifier very similar to this one, and give excellent results in respect of power output and low distortion, as well as in battery life, and low battery replacement cost.

Scheme of the Amplifier

As has been pointed out, the OC72s in the output stage operate in Class B, which means that the standing, or no-signal current drain from the output stage is very low—actually about 3ma. or even less with some transistor pairs. The input circuit of any Class B amplifier stage, whether transistor or valve-operated, requires a certain amount of power to drive it. This is the main reason for using transformer coupling, for the driver transistor is itself a power amplifier producing a few milliwatts in its collector circuit, which must be matched to the impedance of the OC72 input circuit. The only way to accomplish this is to use a step-down matching transformer, and the advantage of doing so is even greater than one might suspect, because in addition to supplying the driving power, the transformer is very easily able to provide two outputs, 180 degrees out of phase, as are required to drive any push-pull stage. For Class A transistor amplifiers, as with their valve counterparts, it is possible to dispense with a transformer and use a phase-inverting amplifier circuit instead, but with Class B stages it is much more difficult to eliminate the transformer.

When valve amplifiers are being designed, there is frequently an advantage in cost to be gained by eliminating transformers, even if this means the use of more valves. This is clearly because valves are cheaper than transformers. At present, however, transistors are still considerably dearer than valves, so that the cost advantage in using extra transistors in order to do away with a transformer entirely disappears.

The driver is an OC71, running at a collector current of approximately 4ma. This is because, as mentioned above, the driver is called upon to supply power, of the order of ten milliwatts. Low-level stages, as exemplified by the first stage in this amplifier, need run at only very small collector currents, with consequent saving of battery power, but the driver must not only supply power—it must operate so that it supplies this power at a particular value of peak collector current. In this case, the peak collector current is designed to be approximately 3ma. Thus, setting the D.C. collector current somewhat higher than this ensures that the required peak signal voltage becomes available well before the transistor either becomes cut off, on the one hand, or on the other, "bottoms", by which is meant that it passes the maximum current of which it is capable, having regard to the load impedance connected in the collector circuit. In addition, a certain amount of leeway is necessary in order that the spread in transistor characteristics may be looked after. That is to say, the circuit must work satisfactorily if any OC71 is plugged in, not just with one which has the exact characteristics as specified by the data sheets. The latter always tend to be slightly misleading, since they give the impression that all transistors of the type have exactly the same characteristics. Of course this is an aim which the makers would very much like to achieve, but which is quite impossible at the present state of the art. The published characteristics are therefore an average of a large number of transistors of the same type, and it must be remembered that it is possible for individual samples to diverge more or less widely from

the performance indicated in the published figures and curves.

Negative Feedback Used

In order to reduce distortion arising mainly in the Class B output stage, a small amount of negative feedback is connected round the last two stages—that is, from the voice-coil winding of the output transformer to the input circuit of the driver. In practice, as the circuit shows, the feedback resistor of 27k. goes to the collector of the first stage. In principle, it could equally well be taken to the base of the driver, since apart from the 25 μf. blocking condenser, this is the same place on the circuit. However, it is better to use the connection shown, since this causes only a negligible disturbance to the D.C. operating conditions of the first stage. If the connection had been made to the base of the second OC71, the bias current of this stage would be slightly altered. The amount of feedbaack is only some 6db., but from the reduction in distortion that it achieves, the loss of gain is quite unimportant, and the feedback is well worth having. The amplifier would actually take more feedback, but it was thought better not to use more, in the interests of stability.

Transistor Bias and Stabilization

All the transistors in the amplifier are provided with the appropriate amount of base bias current. This is done by connecting the base electrode in each case to a potential divider which is across the supply. A further amount of bias is derived by including small resistors in the emitter leads, and the two taken together form a kind of bias and stabilizing circuit that has become almost standard practice in transistor amplifiers. Stabilization is essential because of the quite large changes in characteristics that occur when the temperature of a transistor varies. This can come about both because of changes in the temperature in which the transistors find themselves, viz. the ambient temperature, or that of the surroundings, and because the temperature of the working part of the transistor depends on how much power is being dissipated in it. Unfortunately, the effect of internally generated heat in a transistor is regenerative, because the current passing through it causes its temperature to rise, and this rise allows more current to flow, which in turn raises the temperature further. It is because of this effect that transistors are rarely used with fixed bias. The latter makes circuits very simple, but it can be used safely only when transistors are operated at very small currents, and when they are not liable to extremes of ambient temperature.

The emitter resistors cause negative feedback to occur in each stage, and this would reduce the stage gain if the resistors were not bypassed by large capacitors. These, however, are not effective at D.C., so that the beneficial stabilizing effect of the resistors on the direct currents drawn by the transistors is not affected by the condensers. The potential dividers in the base circuits have been carefully worked out to give not only the desired collector currents, but also the optimum degree of stabilization; these values are therefore important, and should on no account be modified. In the case of the output transistors, the 5-ohm emitter resistor is not bypassed, because, since the transistors are in push-pull, there should be no audio voltage across it to need bypassing.

Coupling Condensers

An unusual sight to those accustomed to valve circuits is the size of the coupling (and decoupling) condensers. It certainly does look peculiar to see a 25 μf. condenser where one would normally expect to find one of 0.05μf.! The reason, of course, is very simple. The transistor base circuits all draw current, and are thus of very low impedance. Consequently, coupling condensers must be chosen with this in mind in order to prevent a large loss at the lower frequencies. It should be remembered that unlike valves, the input impedance of the transistor base circuit is much lower than the value of any of the resistors appearing on the circuit diagram, so that these are no guide to the probable size of the required coupling condenser.

Another important point that is quite likely to cause a certain amount of confusion is the polarity in which the coupling ocndensers are connected. It will be noted that the one to the first OC71 is connected with its positive terminal to the volume control, and the negative to the base of the transistor. This is obviously correct, when it is considered that the D.C. potential of the volume control is that of the positive battery terminal, while the base connection must be at some slightly negative potential.

Where the confusion is likely to arise, however, is that when we examine the circuit further, we find that the coupling condenser to the second OC71 is polarized in the opposite direction, i.e. with the positive terminal toward the base. This is quite correct, and a little thought proves that it is. In this case, though both ends of the condenser are at a negative potential with respect to the positive battery line, one is considerably more negative than the other. The potential divider in the base of the second OC71 makes the base only a fraction of a volt negative with respect to the positive battery line, but the collector of the first transistor is at approximately 3 volts negative with respect to the positive battery line.

To avoid common coupling between stages when the battery runs down, and its internal resistance increases, the base circuit of the second stage, and the whole of the first stage circuit is decoupled with a filter comprising a 150 ohm resistor and a 100μf. condenser.

Volume Control

We would not be surprised if some readers thought that we have connected the volume control potentiometer backwards into the circuit! However, that is

quite a common arrangement with transistors, where, once more on account of the low input impedance, the arrangement normally used with valves cannot be adhered to. With transistors, the object of the volume control is rather to control the current flowing into the base circuit rather than the voltage applied to it. When the input device has a very low impedance, the arrangement shown on the circuit has no effect on it, because except at very low settings, the resistance shunted across the input terminals is a good deal larger than the impedance of the input device itself. An example of this would be a moving-coil microphone, whose impedance might be only 50 ohms or so. Since the input impedance of the OC 71 is of the order of 1000 ohms, there is very little shunting on the microphone, even when the control is at maximum. If the shunting at very low control settings is a disadvantage, it can be overcome by placing a small resistor in series with the "hot" input lead, and this procedure still allows a positive "off" position to be obtained, while establishing a minimum resistance that is shunted across the microphone.

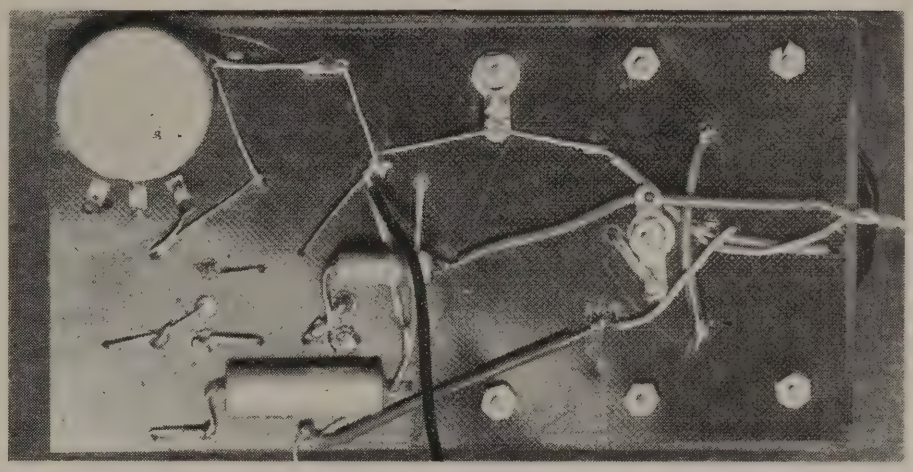


FIG. 2.—*Underneath view of the amplifier. Note that only three components are mounted here, and that most of the connections are made with the leads of the components themselves.*

Input Arrangements for Pick-ups

When an amplifier like this one is used with a pick-up, the latter is usually of the crystal variety. It is clearly impossible simply to connect the pick-up to the input terminals, because at high settings of the control, the impedance across the pick-up can fall to as little as the input impedance of the transistor—i.e. about 1000 ohms. As everyone knows, one cannot operate a crystal pick-up in this way. However we manage it, the input circuit must be arranged in such a way that the shunt on the pick-up is never less than, say half a megohm. This might appear to be an insuperable difficulty until the very simple answer is pointed out. If the pick-up requires a load of, say 500k. for proper frequency response (this corresponds to most of the popular Ronette range, and to some of the Acos range as well), all we do is to place 500k. in *series* with the input lead to amplifier. If this is done, the conditions are not ideal, for with a 500k. volume control, there is more than a slight variation in the resistance across the pick-up as the control is moved. However, since the amplifier is by no means intended for high-quality reproduction into a first-class speaker system, the relatively slight alterations in frequency response that are caused by the variations in load resistance are quite unimportant. To give an idea of the magnitude of the effect, it can be seen that with the volume control fully up, the pick-up load is the value of the series resistor, 500k., plus only the 1000 ohms input impedance of the transistor. In this position, the 500k. of the control is shunted only across the transistor input, and will thus have no effect at all on the pick-up. When the control is at the point of mid-resistance, the resistanec to earth from the moving arm will be equal to 125k., so that the load resistance seen by the pick-up will be 500k. plus 125k., a total of 625k. This is not a great enough variation to cause a noticeable change in the response of the pick-up, and at all other settings of the control, the load resistance is less than this figure, and closer to the required 500k. of the series resistor itself.

Construction

The illustrations show that the amplifier has been built on a small piece of paxolin sheet, measuring 6 in. x $3\frac{1}{4}$ in. The wring has been done according to a technique which we have facetiously described as "printed circuitry without the printing", but which does give a reasonablly accurate idea of the procedure. The board is designed according to the circuit which must be produced, and a glance at the photograph shows that in this case it has been possible to make the actual amplifier lay-out follow the circut diagram almost exactly. The method of construction, after the lay-out has been designed, is to bore a series of holes one-sixteenth of an inch in diameter, appropriately positioned and spaced to allow the leads of the resistors and condensers to be bent at right-angles to the body of the component, and dropped into place through the holes. This places the components themselves on the top side of the board, and their leads underneath. There, they are soldered together to complete the circuit, and this at the same time prevents the components from falling out. Since the leads on most of the parts are reasonably long, and because it is possible to place them quite close together, this method of wiring requires very little in the way of separate connecting wires.

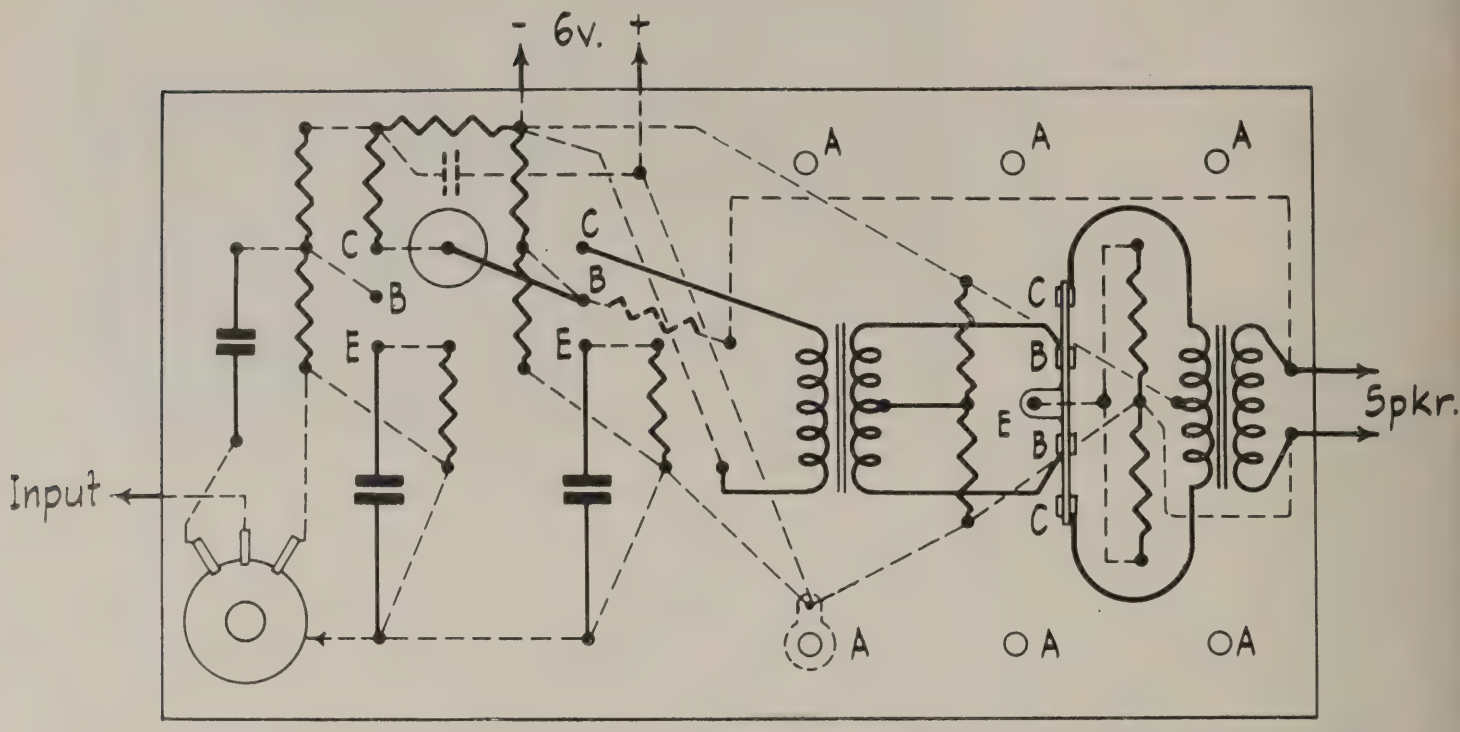


Fig. 3.—*Wiring diagram of the amplifier, full The components and wire drawn in full lines are above the board, while the dotted connections and parts are underneath.*

Transistor Mounting

We have printed here a full-sized wiring diagram, which may be compared with the photographs, and which shows exactly how the wiring is carried out. On the wiring diagram, components have been shown as their conventional symbols, and two kinds of line have been used to differentiate between parts and wiring that are above the board, and those that are underneath. The full lines refer to those above the board, while the dotted wiring is underneath. As mentioned above, most of the latter can be carried out using the actual compnent leads themselves. Only two or three components have to be mounted underneath. One is obviously the volume control potentiometer, and the others are the 27k, feedback resistor and the 100μf. decoupling condenser in the filter feeding the first stage.

Where more than one wire has to pass through the one-sixteenth-inch hole, it is necessary slightly to enlarge the hole concerned with the tang of a file, or some similar object, but the hole should be enlarged only enough to allow the two wires to pass through easily. The coupling condenser between the collector of the first stage and the base of the driver stage is mounted vertically. On the wiring diagram it thus shows as a small circle, with a full lead and a dotted lead both going towards its centre. It can be readily recognized in the photograph.

The first two transistors are mounted each on three solder lugs rivetted to the board. On the wiring diagram these have been shown by labelling them C, B, and E. In this way the whole of the wiring is carried out before the transistors are "plugged in" by soldering their leads to these six lugs. Since the rivet ends of the lugs are hollow, it is still possible to use them as circuit tie-points for the underneath part of the wiring, and for passing component leads through where necessary. This applies, for example, to the emitter bypass condensers, whose upper leads go through the central holes in the rivet lugs.

The OC72s mount in metal clips that are provided with them. Unlike the other transistors, the OC72s have metal cases in order to facilitate the conduction of heat away from them, by mounting them in their metal clips. The metal cases, and therefore the mounting clips too, have no electrical connection with the transistor electrodes, which are brought out through the glass base of the transistor just as with the OC71s. The mounting clips have a hole provided, by means of which they can be screwed to the board, and they mount through the middle pair of $\frac{1}{8}$ in. holes marked A on the wiring diagram. The two transformers mount on the outer pair of similar holes, also marked A.

In order to terminate the output transistors' leads, a five-lug terminal strip is mounted on top of the board, and this can be sen labelled "C B E B C", thus representing the transistor elements that go to the five lugs. Only one is provided for the emitters, since the circuit requires them to be connected together. The flying leads from the transformers go to the

appropriate lugs, as indicated on the wiring diagram.

There is one feature of the latter that may be slightly puzzling if not explained. The circuit diagram shows a resistor of 5 ohms connected in series with the common emitters of the OC72s. When the prototype was built, a 5 ohm resistor was not obtainable, so two 10 ohm resistors in parallel were used instead. These are seen in the wiring diagram between the five-lug strip and the output transformer. They cannot be seen in the photograph because they are hidden by the output transformer. They have been mounted end-to-end merely for convenience, and the outer ends are then connected to put them in parallel, as examination of the wiring diagram shows.

Building the Amplifier

The first step is to manufacture the paxolin board. To make this easier, we have reproduced here a full-sized template, with the correct positions of all holes drawn in. All the builder has to do, therefore, is to cut the board to size, cut out the template from the page, and mount it on the board with sticky-tape. The hole centres are then pricked throught the template with a sharp scriber to give a start to the drill, and then, with the template still in place, a sixteenth-inch drill is put through all holes. This is followed up by an eighths-inch drill for the larger holes, and the board is complete. Note that there is space in the left-hand bottom corner for the volume control potentiometer, but that we have not specified the exact position merely indicated it roughly with two concentric circles. This is because the exact mounting position will vary according to the exact size of the potentiometer used. After making the board, the next step is to rivet in the six lugs for the first two transistors. This done, the components can all have their leads bent at right-angles, when they can be dropped into place through the holes in the board. The wiring on the back of the board is then completed. Next, the transformers are mounted, their leads cut to length, and soldered to the appropriate lugs. Finally, the OC71s are carefully soldered in place, making sure that the leads nearest the red spot go to the lugs marked C, the middle leads to those marked B, and the others, to the ones marked E. While soldering the transistor leads in place it is VERY IMPORTANT to ensure that the transistor is not over-heated. Because of this, the leads should not be cut shorter than about half an inch from the base of the transistor, and when soldering them, they must be gripped with a pair of pliers between the transistor and the point to which the solder is to be aapplied. In this way, most of the heat travelling up the lead is bypassed, and flows into the jaws of the pliers instead of up the wire to the transistor. Even when this precaution is taken, it is good practice to ensure that the soldering bit and both parts of the work are as clean as possible so that the job may be done in the shortest possible time.

With the lay-out used, the leads from the OC72s will be considerably longer than half an inch, but even so every precaution should be taken while soldering the leads, to prevent overheating of the transistor.

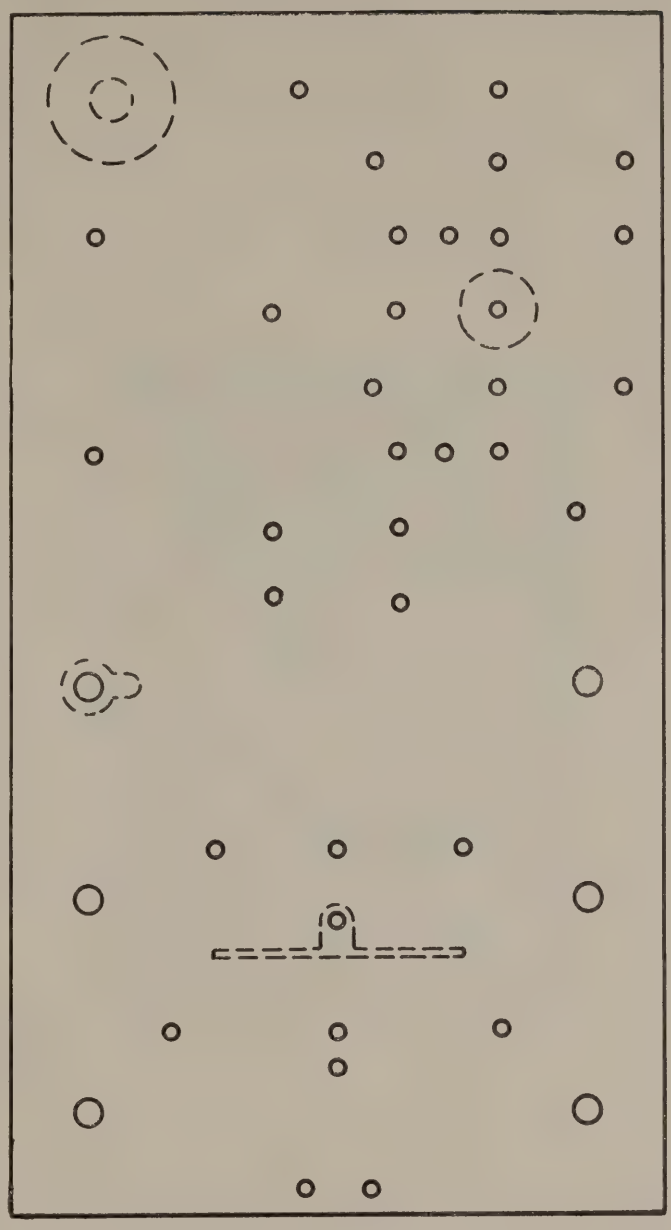


FIG. 4.—*Full-sized template for constructing the board on which the amplifier is built. Note that we have left the back of this part of the page blank so that this template may be cut out without loss of any of the article.*

The final job, then, is to solder the output transistors in place and the wiring is complet except for one small but important point.

Connecting the Feedback

In making the connection between the scondary of the output transformer and the feedback resistor, it is essential to test that the connection made does in fact give negative, and not positive feedback. To

TRANSFORMERS IN THIS AMPLIFIER

Transformers identical with those used in the prototype of this amplifier are obtainable from the office of Radaio & Electronics (N.Z.) Ltd., 48 Abel Smith Street, Wellington, or by writing to the same firm, at P.O. Box 6361, Wellington.

Retail Price, 24s. each transformer

do this, temporarily connect one side of the voice-coil winding to the positive battery line, and the other side to the 27k. feedbaack resistor. If this *increases* the amplification, as compared with that obtained when no feedback is applied, then the feedback is positive. The easiest way to check is to have a small signal passing through the amplifier, and then to complete the feedback connection momentarily. If there is an increase in volume, then the feedback is positive, and the leads of the transformer secondary must be reversed. When this is done, it will then be found that completing the feedback path decreases the volume, and indicates that negative feedback has been established.

Currents and Voltages

We have already pointed out that there is a considerable spread in the characteristics of transistors. Consequently, any figures which we could quote for the operating currents of the transistors, and for voltages in certain parts of the circuit are liable to be somewhat different from those measured on a duplicated version. For example, the transistor collector currents can differ from those of the prototype by quite a large factor without meaning that the amplifier is not working properly. In part, such variations will be due to variations in transistor characteristics, and for the rest, they will be due to the fact that we have not used close-tolerance resistors throughout. However, these differences need not concern the builder, because the circuit has been designed to take care of the differences, and thus to ensure that satisfactory performance is obtained when any transistors of the types mentioned are used.

Measurements taken during construction of the protoype were as follows:

Current drawn by first stage	0.66ma.
Current drawn by second stage	3.8 ma.
Total amplifier current, no signal	7.4 ma.
First stage collector current	0.53ma.
Second stage collector current	3.5 ma.
No-signal collector current of OC72s	1.2 ma.

The differences between the stated collector currents and the corresponding *stage* currents represents the current through that stage's bias bleeder network.

When checking on the amplifier current, it is liable to cause trouble if a meter with too high a resistance is placed in series with the negative battery lead to the whole amplifier. Even a relatively small resistance of a few ohms is liable to cause instability of the amplifier, so that it may well be found that a current meter on one of its more sensitive ranges causes this trouble. The same meter switched to a higher current range will have a lower resistance, anad the trouble may thus disappear. This effect has been mentioned, since the builder may spend fruitless hours looking for non-existent faults if he does not know about it.

Matched Pair of Output Transistors

Since OC72 transistors are so often used in pairs in Class B amplifiers, they are sold either singly or in matched pairs. For the purposes of this amplifier A MATCHED PAIR MUST BE USED IN THE OUTPUT STAGE. Hhere is no question of matching the OC71s, since these act quite independently of each other in their single-ended stages.

Receivers

A CRYSTAL SET FOR TRANSISTOR AMPLIFIERS

The transistor amplifier which is described in this issue is ideal for portable radio sets as well as for general-purpose use. Those who contemplate building it might like to try this up-to-the-minute version of the time-honoured crystal set. It has enough output to fully load the amplifier, as long as a reasonable aerial is employed, and can be used with any conventional valve amplifier if desired.

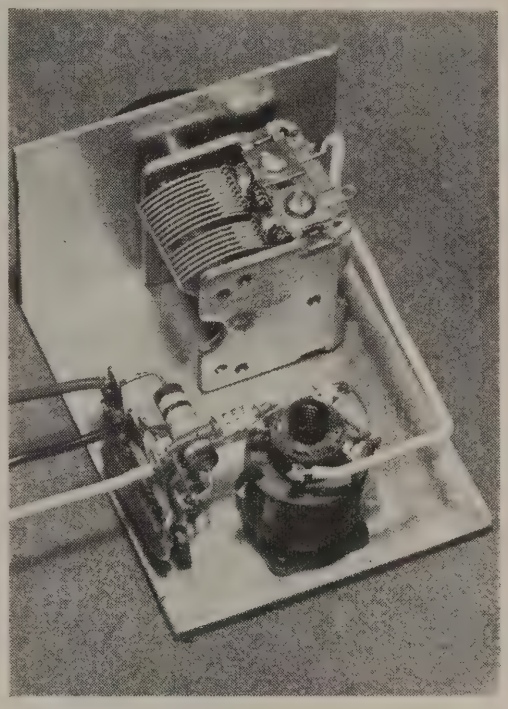
Introduction

An introduction is hardly required for our older readers, who, like the writer of this article, probably built crystal sets in the very early days of radio, and have long since moved on to far more advanced things! However, we are not really presenting this circuit for the benefit of beginners (although it is an excellent project for them, too), but for the aforesaid advanced worker, who is perhaps tackling transistors for the first time, and who would like a simple "R.F. end" that will allow him to test the amplifier out on music if he does not want to use a pick-up as a source of signal for this purposes. Indeed, provided a suitable aerial is used with this crystal receiver, there is no reason why, in conjunction with the transistor amplifier, it should not constitute a permanent receiver—at least until a more advanced transistor tuner has been built.

Performance of the Tuner

It is not possible, of course, to predict how well a tuner of this ultra-simple kind will perform under all possible conditions of use. For example, no claims can be made for it that it will give anything but local reception. Then again, the selectivity of a simple crystal set is so rudimentary that it is not even possible to say how well it will perform in any urban area, without trying it. However, the expenditure in time and money that is involved in seeing how it does manage in your own locality is so small that the attempt is well worth while, especially since most of the parts can be found in the well-stocked junk-box. Even if every thing is bought specially for it, the parts will certainly come in useful for further work on transistor-operated tuners. This has been looked after in designing it, for it uses a Neosid iron-dust pot core such as are a virtual necessity when it comes to building transistor tuners, whether T.R.F. or superhet.

To return to its performance, we can say that in Wellington it has been found to give excellent results with the transistor amplifier described in this issue. An outside aerial is needed, but this need not consist of anything more ambitious than thirty feet of wire ten feet or so above the ground. This will give perfectly readable signals from the local stations, and the selectivity is great enough to separate 2YA from 2YC, and to give an interference-free signal from 2ZB.



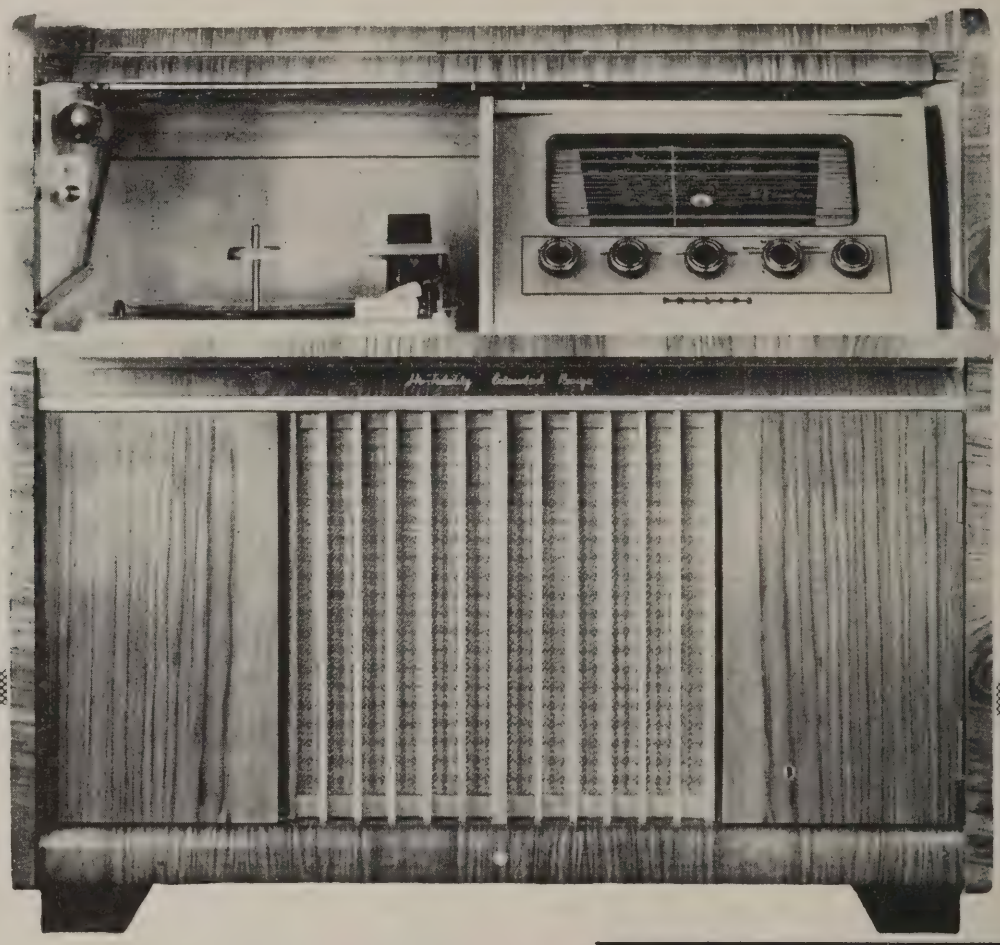
General view of the crystal receiver.

The only trouble we have experienced with it has been from break-through of a signal from the Tinakori Hill transmitting station, which, from the conversations overheard, appears to be the one carrying the coastal shipping traffic. This station's frequency is not so far above the broadcast band, and in town, where our office is, it puts in a very strong signal which is able to break through the selectivity of any crystal set and make itself heard even when the set is tuned to 2YA! Of course, this sort of thing has just to be put up with by the user of a crystal set, and there is little doubt that similar experiences will be the lot of many who use this circuit in other places.

The Circuit

It will not take a very long look at the circuit diagram to show that in some important respects,

Discover HI-Z, the great



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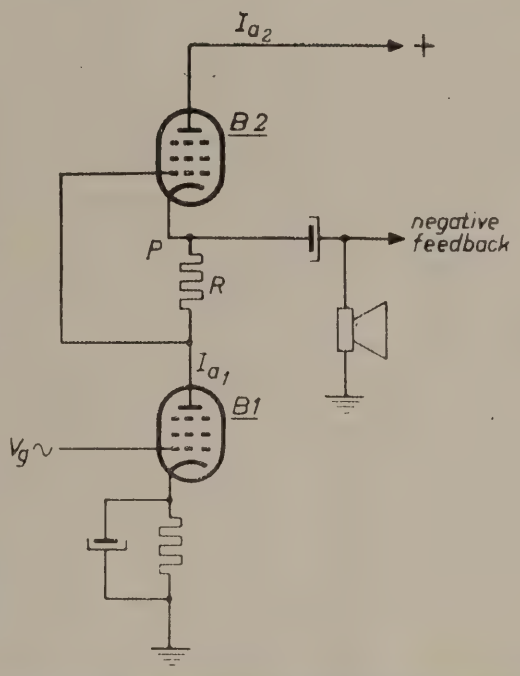
WHAT IS HI-Z?

-Z has just made its appearance
w Zealand, here are some facts
ning this greatest development
HI-FI.

ventional receiver design, a loud-
transformer is a necessity in order
ch the low impedance of the loud-
to the output valve, requiring a
igh load impedance. Unfortunately
udspeaker transformer, however well
cted, has serious limitations which re-
the frequency response of the audio-
r being adversely affected.

HILIPS HI-Z musical equipment no
aker transformer is used. The loud-
itself is directly connected as a load
specially developed output circuit,
liminating the major cause of dis-
For this purpose the high im-
e loudspeaker is used in combination
HILIPS special single-ended push-
utput circuit. This combination is
ed under the name HI-Z (Schematic-
own in the diagram at left).



ADVANTAGES OF HI-Z

1. Better frequency response curve, especially for low note reproduction, due to the absence of a loudspeaker transformer—the weak link in conventional HI-FI equipment.
2. High efficiency of output stage since the full electrical output of the power valve is dissipated in the loudspeaker.
3. Less distortion.

The future will undoubtedly show the HI-Z output stage to be one of those basic PHILIPS developments that have more than once in the past re-shaped sound-reproduction design.

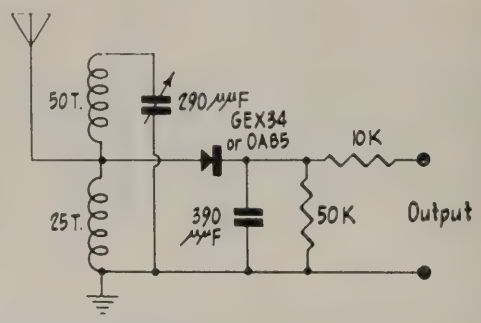
this arrangement is rather different fromthoseusually built to power a pair of headphones, or even to feed into a valve amplifier. In the first place, the detector circuit is connected across only a small portion of the tuned circuit, and has an unusually low load resistance. This arrangement serves two purposes. In the first place, connecting the detector across only a portion of the tuning circuit improves considerably the selectivity that is obtainable. Secondly, the use of a low load resistance enables the detector to have a relatively large output *current*, which is a requirement when the tuner is to feed a transistor amplifier, rather than a valve, which requires a large *voltage*. However, if a low load resistor is to be used, this makes it all the more necessary to tap the detector circuit down the tuned circuit, for if the low-impedance detector were connected right across it, not only would the output almost disappear, but also the selectivity be much poorer even than that of a conventional crystal detector circuit. Again (and here is a third important point) in order to make the most of the very limited power available from the aerial, it is essential that the aerial should also be tapped well down the tuned circuit. One way out of this would have been to put on a separate aerial winding, but since a fairly low tap is available, this circuit can be simplified by connecting the aerial to the same point as the detector. As can be seen from the diagram, the aerial and detector together are connected across only a third of the total winding. This results in only one-ninth of the shunting on the tuned circuit that would occur if the detector were across the whole coil.

In the output lead there is shown a series resistor of 10k. This should not be omitted, as it prevents the input circuit of the transistor amplifier from short-circuiting the detector load resistor when the control is at high settings. If the tuner is to be used with a valve amplifier, the 10k. resistor can be left in circuit, as it will have no noticeable effect on the performance in this case.

Components for the Tuner

The coil is wound by the builder himself, but he need have no qualms about undertaking it, since with the Neosid pot core, the job is an extremely easy one. These cores come with a special former which fits inside them. It is made of transparent plastic—probably polystyrene—and has several ribs which enable different windings to be put on quite easily. If a winding takes up more than one of the spaces thus provided, it is possible to carry it on to the next slot, since small gaps are to be found in each spacing rib, through which the wire may be led to the next compartment. Holes are provided in the halves of the pot core to enable the lead-out wires to be brought out. Thus, the job of making the coil is as follows.

The upper part of the winding, namely 75 turns, is put on using two of the slots in the former. About



Note: In the photograph, only the front section of the two-gang condenser is used.

half the required number are put in the outside slot, after which the remaining turns of this winding are put into the next slot. This completed, the wires are led out of the slots, first having been spotted in place with wax.

Next, the small winding of 25 turns is put on in the remaining slot, and the starting and finishing ends waxed in position. The wire gauge used is quite unimportant, provided that the required number of turns can be accommodated on the former. In the original, 36-gauge enamelled wire was used, with room to spare! Since only three connections are to be made to the coil, there is no need to use four separate leads out of the pot core. The best plan is to twist together the end of the large winding and the start of the small one, and put them through a short length of sphagetti; this process prevents errors in connecting up the two coils which may occur if all four leads are brought out separately. Next, sphagetti is slipped over the two remaining leads, and the three pieces are brought out so that when the halves of the pot are put round the coil, they come through the holes provided, without undue pulling and straining. The pot halves are accurately ground so that they fit together without leaving a gap, and when placed together, they can be held by the simple expedient of winding a single turn of sticky tape round them. This will hold them very firmly.

The mounting of the finished pot is looked after very easily, for sold with each core and former is a mounting system made specially for the job. This consists of a square mounting base, which has protruding from it a tubular piece which fits easily into the central hole in the cores. Also provided are two paxolin washers which are a neat fit over the mounting tube. First of all, one of these is put on to the tube, and slid right down to the bottom. Next, the completed pot is put on, and this is followed by the remaining washer, which is pushed down firmly over the pot. The remaining piece of hardware provided is a split paxolin washer, on which are fixed four soldering lugs. The split washer must be sprung out slightly to enable it to fit over the end of the mounting tube. This is done, and it will then be noted that there is a small shoulder near the top of the tube which prevents the split washer from being slid farther down.

Thus, it is slid down until it bears on the shoulder, and left there, its natural spring holding it tightly in place. All that remains now is to bare the ends of the coil wires and solder them to the connecting lugs. The square base of the mounting device is already provided with two holes, tapped 6 BA, so that a pair of $\frac{1}{4}$ in. BA screws are all that are needed in order to fix the assembled coil to the aluminium chassis.

Variable Condenser for Tuning

Tuning is carried out with the variable condenser, and this can be any suitable component that one may have in the junk box, or it can be specially bought for the occasion. The one illustrated in the photograph is actually a two-gang, of Japanese manufacture that seems to be available in the parts dealers at the present time. It has two sections of different sizes, intended to be used for a superhet tuner, without the necessity for a padder. In our case, only the larger section was used, as this gave exactly the right capacity to allow the tuning just to cover the broadcast band. However, any tuning condenser may be used, provided it has a large enough maximum capacity, so that there is no need to worry about buying one specially if another is available.

Construction

The chassis diagram and the photograph are all that are needed if it is desired to build the tuner in exactly the same form as the original, and there is no need at all for us to go into further detail. The small tag-strip used, together with the four coil lugs (one of which is free, and can be used as a tie-point) provide plenty of tie-points to enable the wiring to be done exactly as in the original. After wiring it up, all that has to be done is to connect the aerial, connect the output to an amplifier, and away it goes. Only one word of warning against using "cheap" crystal diodes. Very often, these are found to be nothing but low-valued resistors. This is not quite so facetious as it sounds, for at least one British manufacturer has been "dumping" reject crystal diodes on the market at a very low price. Some of them work quite well, but some are exactly as we have just described—i.e., they do not function as rectifiers at all. At that, they are hardly worth their half-crown, or whatever it is. These types can readily be distinguished by their lack of a printed type number, so there is no need to fall into this trap. Treated properly, crystal diodes are ever-lasting, so that a good one bought for this job can certainly be used again for any one of a wide variety of purposes.

A RECORDER GRAM CIRCUIT

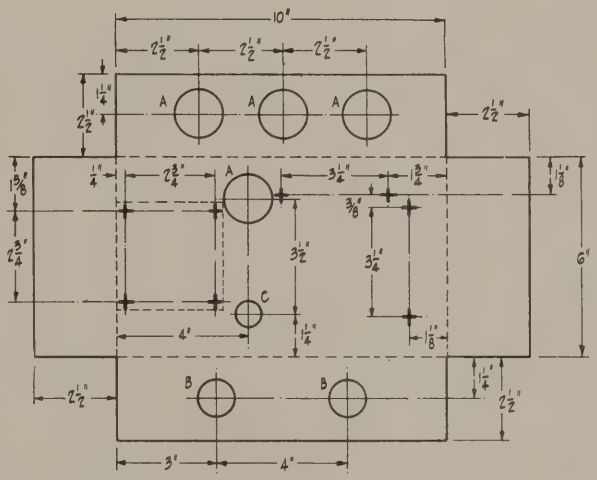
(*Continued from page 27.*)

power supply to feed it. There are two similar sockets mounted beside this one, and these take A.C. off to the main amplifier chassis and to the record turntable.

On the other side of the power supply chassis are two octal sockets to take filament and H.T. power to the recording amplifier chassis and the tuner chassis respectively. The two relays on the tuner chassis have their coils supplied from the 250 volt H.T. line, via a series resistor to cut the current down to the minimum reliable operating figure. The tape playback change-over relay is energized via the playback switches on the tape deck. Thus, it is necessary for the "hot" coil lead to proceed from the tuner chassis to the tape deck. The tidiest way to do this is to take the lead into the power supply chassis, through a spare contact on the socket, and thence to the tape deck through the power supply cable that goes to the recording amplifier chassis. The leads to the tape deck switch then go independently from the latter to the deck.

The tape playback compensation relay is also energized from the H.T. line, via the compensation switch on the recording amplifier chassis. Thus, the coil of this relay too has its "hot" lead proceeding from the tuner chassis to the recording amplifier chassis by way of a further spare lug on the power supply cable.

This method of connecting the relay coils (one side of each is earthed, in the tuner chassis) enables the



dropping resistors to be situated in the power supply chassis, and connected between the two octal sockets, into which the power cables plug.

(To be concluded)

"R. & E." prottotypes are frequently available for sale at attractive prices. If you are interested, please write to "Radio and Electrical Review," P.O. Box 6361, Wellington. Telephone 50-660.

Transistors

TRANSISTOR AUDIO AMPLIFIERS—Part 4

This month we continue the story of audio amplifiers using transistors with some observations on the use of transistors as power amplifiers. In this application, they can compete more than favourably with valves on some counts, but on others, valves still have the edge on them, and are to be preferred for some applications.

The Power Amplifier Problem

So far, we have not considered transistors in the role of power amplifier, although it has been pointed out on more than one occasion that all amplifiers, valve, transistor or otherwise, can accurately be described as power amplifiers. The circuits we have discussed are those which bear a rough correspondence to what in valve circuits are always known as voltage amplifiers. It appears, therefore, that if we are to obtain a proper understanding of the problems of building power amplifiers from transistors, it will first be necessary to define what is meant by the term.

What is a Power Amplifier?

This digression is brought about by the fact that, as often takes place in technical subjects, a certain term can have two meanings. Usually, one of these is a strict meaning—strict in the scientific sense, that is—while the other is a loose term, whose precise meaning is not obvious and is known only to those habitually dealing with the subject and the terminology of it.

In the common or loose meaning of the term, a "power amplifier" may be defined as one whose *primary* purpose is to provide a relatively large power output. Other amplifier stages may have as their main job in life bringing a very small signal up to a suitable level for driving the power amplifier. In valve amplifiers, these are almost always known as voltage amplifiers, while in transistor amplifiers, the early stages can also be legitimately called voltage amplifiers or current amplifiers, the latter being the most logical.

The fact is, that all amplifier stages are power amplifiers, even if in most cases we prefer to forget that aspect of their performance. Now in the last sentence we have the reason for this explanation. There, the term "power amplifier" has been used in its broad, and exact sense, of an amplifier which provided more power at its output terminals than is fed to its input terminals. From this, it would appear that the broad meaning of the term makes it a poor one, for if our definition of it is accepted, then the word "power" is unnecessary. However, there is every justification for the other terms, namely voltage amplifier and current amplifier, for it does not take much thought to realize that a power amplifier need not have a voltage gain. Take for example, the case of a valve feeding a loud-speaker. A 6V6 might need a signal of 10 volts at its grid to enable it to develop maximum power in the speaker. But if the speaker is a low-impedance one, the amplifier's output voltage may well be much less than 10 volts, even though the power amplification within the stage may be enormous. The feature of a 6V6 that distinguishes it from, say, the 6C5 that may be driving its grid is that the former is capable, under the right conditions, of producing a power output of several watts, while the latter, in its resistance-capacity coupled circuit cannot produce even a small fraction of this amount of power.

Power Gain and Transistors

When we are dealing with valve amplifiers, the term *power* gain is used relatively seldom. This is because the idea of voltage gain is much more useful in describing the performance of the individual stages that make up the amplifier. With transistors, the gain of individual stages can also be expressed readily as voltage gain, provided that resistance-capacity coupling is used. But when transformer coupling is the order of the day, we have the same situation as the valve power amplifier. That is to say, each stage will have only a very slight voltage gain—if any at all—because each inter-stage transformer is a step-down affair (in terms of voltage) used for impedance-matching, just as is the output transformer of the 6V6 amplifier we were considering a moment ago. Thus, it is much more sensible in a transformer-coupled transistor amplifier to talk about its current gain. For instance, if we have several stages, each using transistors of the same type, under the same operating conditions, the inter-stage transformers will be identical, and so will be the input impedances of the stages. Under these conditions, the current gain of each stage is a logical way of describing and assessing its performance. But if the amplifier does not use transistors all of the same type, the input impedances will not all be the same, and there is then little point in talking about current gain, because the differing stages input impedances will not allow the input

current to be used as a method of comparing the signal level as we progress from stage to stage.

Under these conditions, the only way to describe the performance of the amplifier stages is to talk about, and measure, if required, their respective stage gains *on a power basis*. That is to say, the power gain of each stage then becomes a measure of its performance, and the total gain of the amplifier can then be estimated by adding together the power gains of the individual stages, if these are expressed in decibels.

In the published data on transistors, stage gains are often expressed in this way, which is why we have gone to all this trouble to explain the term. If we are to become as familiar with transistors as we already are with valves, things like this are those that we have all got to learn in the process, so that we can read transistor data sheets knowing what they mean.

Power Amplification Only Relative

In the definition of power amplifiers given above, the term "relatively large power output" was used on purpose. For example, a stage can be described, quite legitimately, as a power amplifier under this definition, even if its output power is only ten milliwatts. Even this small figure is large compared with the output power of the transistor which drives it; in any case, it will usually be given the job of delivering its output power to a load of some sort. In this case, the load would probably be an ear-phone. However, it could equally well be the input circuit of a Class B transistor power amplifier designed to produce, say, 300 milliwatts, which brings us back to the main purpose of this article, which is to discuss the power amplifiers themselves.

Advantages of Transistors in Power Amplifiers

The first, and most often-quoted advantage of transistors in power amplifiers is their high efficiency, which is much higher than that of valves. It should be explained that this is applicable both to Class A and Class B stages. The plate efficiency of valves is much smaller than the collector efficiency of transistors, and the possible performance of Class A stages gives a good idea of the vast difference between the two.

The maximum theoretical efficiency of a Class A triode is twenty-five per cent, and in practice, the actual efficiency rarely exceeds fifteen. This means simply that for every fifteen watts of audio output, the valve draws 100 from the B supply. With transistors, on the other hand, the maximum theoretical efficiency in Class A is 50%, and it is not unusual for actual efficiencies of 40% to be obtained. In this case, for fifteen watts output only 37½ watts are drawn from the supply. If we consider the dissipations, or the amounts of power consumed, but which produces no useful result, the comparison is still more in favour of the transistors. Using the same examples, we see that in the valve stage, an output of 15 watts requires a plate dissipation of 85 watts, while in the collector of the transistor amplifier producing the same useful output, only 22½ watts are dissipated. Thus, from this standpoint alone, the transistor stage is almost four times as efficient as the valve stage. The actual improvement is greater still, because we have not taken into consideration that several watts of filament or heater power will be needed for the valve amplifier, while the transistor one needs no other source at all.

Class B stages are by no means new, since they date from the late nineteen twenties. With valves, however, they have never been extensively used, except for two purposes. One is for amplifiers giving outputs of a hundred watts or more, and the other is for outputs of any size, when the plate power has to be drawn from dry batteries. The reason for their use is that a Class B stage is considerably more efficient than a Class A stage, irrespective of whether valves or transistors are used. In a Class B stage, unlike Class A, the valve or transistor does not conduct for the whole of the input cycle. Usually, the bias is arranged so that each valve conducts (and thus amplifies) only during one half-cycle of the input wave. Because of this, it is not possible to build a single-ended Class B audio amplifier. A pair must be used, connected in push-pull, and so arranged that one tube amplifies that half-cycle that is not amplified by the other. In this way, the outputs of the two tubes or transistors add up in the output transformer to re-create the whole waveform. Now the high efficiency of a Class B stage is due simply to the fact that each tube conducts for only half the time, and the theoretical efficiency and the actual efficiency of a Class B amplifier is very much greater than that of a Class A amplifier. In addition, the D.C. plate current is almost zero when there is no input signal, and rises in almost direct proportion to the signal input, until maximum power output is reached. Because of this feature, the current consumption of the amplifier depends on the amount of power which the amplifier is called upon actually to deliver. In other words, you pay only for what you get. With a Class A stage, you pay at the same rate at all times, irrespective of whether the output is zero or maximum, or anything in between. For battery-operated equipment, this is obviously of the utmost importance and utility, so that, while it would be possible to produce reasonably economical Class A amplifiers with transistors, Class B amplifiers increase the life of a given battery many times by comparison.

A RECORDER GRAM CIRCUIT FOR AMATEUR CONSTRUCTORS—Part 6

This month we give a short description of the tuner arrangement which forms an essential part of the recorder-gram, together with the details of the power supply which feeds everything except the main amplifier, which is self-powered.

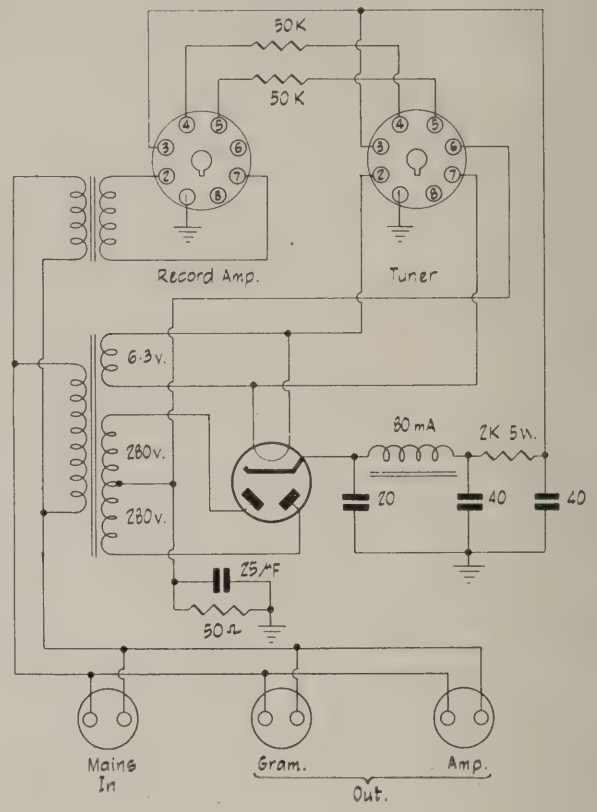
Errors in Last Month's Diagram

Last month we printed a circuit for the tuner, and the chassis diagrams for the main amplifier, and the tuner-pre-amplifier chassis on which most of the auxiliary services are concentrated. Unfortunately some errors crept into the tuner circuit diagram, but these are put right this month, for we are printing here a corrected diagram. The first error (and a most unfortunate one too) was that the sign "H.T. 250v." was attached to the A.V.C. line instead of to the H.T. line. The others concerned the oscillator circuit, in which the 47k. grid leak was shown on the wrong side of the grid condenser, and the wiring of the tertiary winding of the second I.F. transformer.

In the new diagram, which has been re-drawn, these errors have been rectified. One other change has also been made. It concerns the output cathode follower. It has been found that with the original set-up, in which a Collaro transcription gramophone unit was used, the output level obtained when the radio positions are selected is greater than that from the pick-up, and from the tape deck. This means that in order that the levels from the three audio sources shall be as nearly the same as possible, the audio output from the tuner's cathode follower needs to be slightly reduced. The different arrangement of the cathode follower's load resistor chain has been used in order to achieve this.

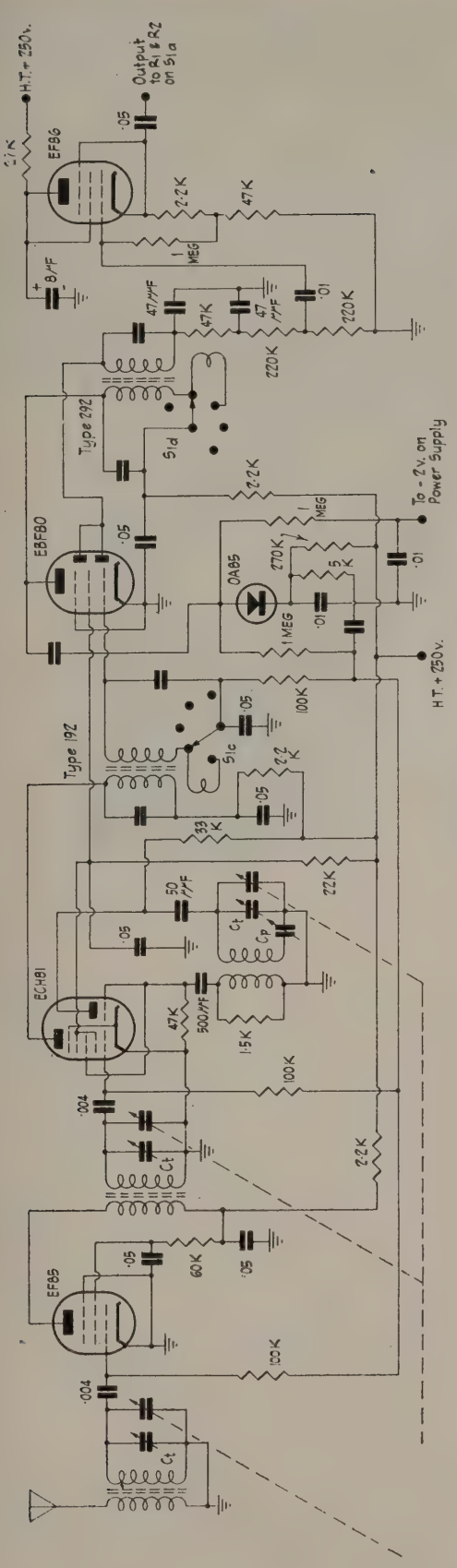
Even with this arrangement, slight differences in level must be expected when one switches from gram. to radio, or to tape playback, etc. This is because the actual volume of sound obtained when the selector switch is operated will depend not only on the equipment, but on various operators. For instance, the sound level from the tuner will always depend on the person monitoring the transmission, as well as on the strength of the R.F. signal, to some extent. The latter variation on local stations is quite negligible, since it is taken care of by the very good A.V.C. of the tuner. Similarly, when a programme is recorded, the person working the tape deck may not have set the recording level control so that the tape is fully recorded on peaks. Again, some gramophone records have a much higher level on them than others. All these varying factors, some of which are outside the control of the operator of the recorder-gram, make it impossible to ensure that when we switch from one function to another, no readjustment of the volume control will be needed.

What we have ensured, however, that under no conditions of use can there be a great change in volume when the function switch is operated. It is thus impossible for the operator to blast himself out of the room when he switches, for example, from record playing back to radio, or from radio or record player to tape playback. From the user's point of view, this is most important, as nothing is more annoying than to have to dive for the volume control every time the main switch is operated.



The Tuner Circuit

This is quite straight-forward, and holds no special difficulties for the builder. On close examination, it is found to be rather unusual in some respects, but these are confined to design considerations, concerned with keeping the bandwidth great on the "broad" position of the selectivity switch, without jeopardising either the gain or selectivity on the "narrow" position. In this way, such a tuner largely succeeds in obtaining the best of both worlds, as it were. The circuit and valve line-up are very similar to those of a previous dual-bandwidth tuner with which many builders have had considerable success, and while it does not give the superlative results for which the synchrodyne is justly famous, it



does represent a remarkable improvement in broadcast receiving quality over the conventional fixed-bandwidth receiver.

A high-gain R.F. amplifier tube, an EF85, is used, and this enables the aerial and mixer grid tuned circuits to be broadened out with shunt resistance, while still retaining a normal stage gain. It should be pointed out that this shunting of the tuned circuits has been carried out by using shunt feed for the A.V.C. voltage, and making the feed resistors low enough in value to give the desired amount of shunting. This has been mentioned because on a previous occasion when we used this trick, several readers wrote in to us wanting to known where the shunting resistors were that were supposed to be across the tuned circuits. In the normal series feed arrangement for the grid circuits, it is common to use a 100k. decoupling resistor in the A.V.C. line, to each grid circuit, but since this resistor is bypassed, it has no shunting effect on the tuned circuit. The present circuit illustrates this in the grid circuit of the I.F. stage, which also uses the same 100k. resistor from the A.V.C. line. In this position, it is bypassed by the 0·5 µf. condenser, and is at the "cold" end of the tuned circuit, so that it canot shunt the latter.

Second Power Supply

The second power supply feeds everything in the recorder-gram except the main amplifier. There are in all thirteen valves attached to the second supply, but their H.T. totals only about 50ma. This is because eight of the thirteen are resistance-coupled audio amplifiers of one sort or another, and so draw very little H.T. current. The biggest problem in designing the supply, however, was the large number of heaters to be supplied. The total current drawn by them is 3·3 amps, which is brought up to 3·9 amps by the dial lights. It was decided to use a power transformer of 80ma. capacity with the original equipment in order to keep down the heat dissipated by the transformer, since the equipment was to be built into a cupboard. Thus, although the H.T. winding was running light, and it might thus have been possible to draw more than the rated current from the filament winding, it was considered preferable to add a small filament transformer, which itself would not be heavily loaded.

A.C. Plugs and Sockets

Earlier in this serial story, we mentioned that the A.C. input from the mains enters the recording amplifier chassis, from where the phase and neutral wires are taken to the two power supplies, the tape deck, and the gramophone turntable. Since the record amplifier chassis is so close to the tape deck, the wiring between these two is carried out directly, without plugs and sockets, and is done in the manner illustrated on the circuit diagram of the recording amplifier. A further pair of wires is taken to a socket on the small

(*Continued on page 23.*)

ELECTRICAL AND TRADE SECTION

PYE HOLD JUBILEE SALES CONVENTION

Dealers assembled for the Pye sales convention dinner.

The radio industry's big event of March was the jubilee sales convention held by Pye (N.Z.) Ltd. on the 25th, 26th, and 27th of that month. The purpose of the convention was two-fold—to introduce to dealers the 1958 range of Pye and Clipper radio sets and radio-gram. combinations, and at the same time to celebrate the silver jubilee of the Akrad Radio Corporation's factory in Waihi, well-known as the production unit of the New Zealand Pye group of companies.

For such an important occasion, something special was clearly called for, and there is no doubt whatever that something extra-special was turned on!

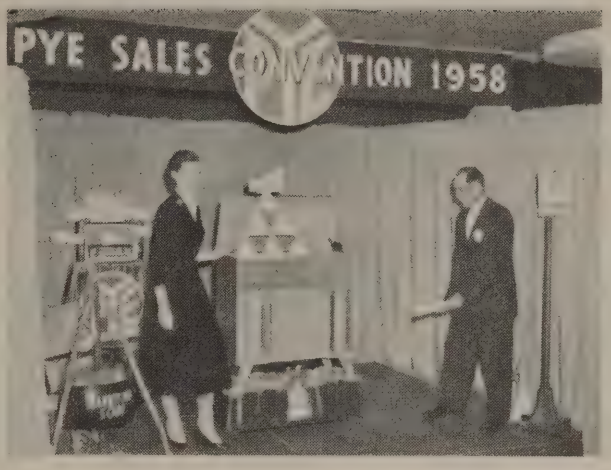
Pye dealers from Whangarei to Invercargill were invited to Auckland as guests of the company, and were accorded what can only be described as lavish hospitality during their stay of three days. We can vouch for this absolutely, for "R. & E." was privileged to be present, also as the guest of the management.

Colossal Organization

Imagine the problems involved in assembling about a hundred visitors from all over the country, providing accommodation for them in Auckland for three days, and keeping them pleasantly busy for that period with a) sales conference lasting a whole day, and with hospitality and entertainment for the remainder of their stay, and you will have some idea of the amount of work that was put in by managing director George Wooller and his executive staff. According to George, the presiding genius behind the "show" was Jack Walch, whose every-day job is looking after Pye publicity and sales promotion; Jack, however, disclaims this, saying with more than a little justification that it was team-work by the whole staff that carried the day. From our own observation, this was undoubtedly true, and to mention everyone who contributed to the undoubted success of the gathering would entail a list of the whole management and staff of Pye (N.Z.) Ltd., and G. A. Wooller & Co. Ltd.!

Dinner First

Proceedings kicked off to an excellent start on Tuesday, March the 25th, with a convention dinner, at which the Hon. R. Boord, Minister of Broadcasting and Minister of Customs was the guest of honour.



ABOVE: Hon. Raymond Boord addressing dealers at the conference dinner. From left—Mr Kelvin White, Mr G. Souness, Mr T. J. F. Spencer, Mr G. A. Wooller, Mr C. Christianson, Mr A. M. Cooper. RIGHT: Mr Ken Smith, Pye's Christchurch branch manager, introducing one of the 1958 range, with the assistance of Fleur Young.

After the toast of the Queen had been honoured, Mr Wooller welcomed distinguished visitors and guests to the convention, and introduced Mr W. H. Knox, who traced the development of the Akrad Radio Corporation from its earliest days, paying tribute to its founder, Mr Arthur Wrigley, whose skill and foresight had established the factory before the late war, but who had unfortunately not survived to see the great outcome of his pioneering work—the present-day much enlarged and modernized factory which is now part of the world-wide Pye organization.

In his address to the convention, Mr Boord paid tribute to Pye as one of the largest and most successful units of New Zealand's considerable radio industry, quoting from its impressive record of trading and manufacturing successes. The Minister went on to speak of a subject which, he said, he knew was uppermost in the whole industry's minds today, namely television. Unfortunately, as has already been reported in the daily Press, he was not able to hold out any hope for its early introduction. The Labour Party had said before the recent election, went on Mr Boord, that it was in favour of the introduction of television at the earliest practicable moment, and that policy still stands as far as the Government was concerned. At this point Mr Boord changed his identity as Minister of Broadcasting for that of Minister of Customs, and after this somewhat Pooh-Bah-like feat, went on to say that, as Minister of Customs, it was his unpleasant duty to inform the assembled company that the Government could not see its way at present, or in the foreseeable future, to the establishment of a service which would undoubtedly aggravate the situation which the current import restrictions were designed to alleviate. Unfortunately, unlike Pooh-Bah, the Minister of Broadcasting did not invite his listeners to "Come over here where the Minister of Customs can't hear us", so that everyone was left with the no doubt true impression that if there had been an argument between the two gentlemen, the Minister of Customs had won it!

The Sales Conference

After Mr Wooller had thanked Mr Boord for his address, Mr T. J. F. Spencer, Pye's well-known managing director, proposed the toast of "Our Visitors", and this having been honoured in rousing fashion, the National Anthem was sung and the official part of the evening's proceedings broke up. From what we heard next morning, by no means all those present followed the excellent example of those who departed for bed in anticipation of a full programme the next day at the "Sorrento", One Tree Hill, where the sales conference was held, and where dealers were introduced for the first time to the forthcoming new range of Pye and Clipper models for 1958.

Transistors and Printed Circuitry

The outstanding features of the newly released models were undoubtedly the new Pye transistor portable, and the extensive use of printed circuit techniques in this and many other models of the range. Pye are so far the only people in this country to be making their own printed circuit boards, and also, we think to be using them in domestic receivers. A highlight of the conference was the exposition by Mr Gordon Rowe, production manager at the Akrad factory, of the advantages of printed circuits both in manufacture and in subsequent service in the public's hands. A notable feature of the conference was the way in which dealers were asked for constructive criticism of the models that were released, and we noted that several very worth-while suggestions were forthcoming, and also that in many cases, these were accepted for immediate implementation, where this was possible. The models released were far too numerous to mention in detail here, but readers will almost certainly see them figuring in our New Products page ere long. Another impressive feature of the new range

was the excellent styling and most pleasing finish to be found on most of the models, regardless of their price range. Altogether, this journal was most impressed with the enthusiastic reception accorded the releases by the large and representative number of dealers present, and by the obvious spirit of co-operation between them and the executive staff of Pye.

Cocktail Party at "Roselands"

Following the sales conference, Mr and Mrs George Wooller entertained the members, and many others, at a cocktail party held in an enormous marquee in the grounds of "Roselands", their Remuera home. If the day had been spent "hard at it" in the business sense, it was obvious that George had determined that hospitality was to be the order of the evening's proceedings. What appeared to be about two hundred people, were regaled with a sumptuous buffet dinner, helped down (if it needed it) with a most liberal supply of what we have been led to believe were very-much-restricted imports! There was certainly no end that evening either to the good cheer which prevailed among the guests, or to the means of ensuring it, and George's hospitality extended even to the provision of swimming togs for those who, on that warm Auckland evening, felt the need to cool off in the torch-lit swimming pool hard by.

Thrill of the evening for many who had not previously had an opportunity to meet him, was the presence of Sir Edmund Hillary, who told "R. & E." of the splendid success scored by the New Zealand-designed and built radio equipment used by his party in the Antarctic. It gave him not a single anxious moment, he said, and performed perfectly during the whole of his journeyings—in marked contrast to the performance Sir Vivian Fuch's party obtained from their equipment of a similar kind.

Visit to the Akrad Factory

On the third day, those who could afford the time away from their businesses were driven to Waihi, where they were escorted through the Akrad factory, where they saw the whole operation of the unit which produces all Pye and Clipper radio sets sold in New Zealand. Naturally, the chief point of interest for many was the department in which the printed circuit boards are produced. This is a story in itself, and we hope before long to print a feature article on this aspect of the Pye production. The visit proved a most fitting wind-up to a memorable three days' visit to Auckland, and to what was voted by one and all a "wonderful show" on the part of everyone connected with the convention.

Needless to say, many pleasant hours were spent in more or less convivial surroundings, renewing old friendships and in making new ones (we know we did, at least) and it was with genuine regret that everyone departed back to toil and worrying once more about those mark-ups, about which, incidentally, surprisingly little was heard during the convention.

TRADE WINDS

16 2/3 *r.p.m. RECORDS ARE HERE!*

In a recent list of record releases from H.M.V. (N.Z.) Ltd., comes the news that at last radiogram owners will be able to use that slow record speed! Under the designation "IC", H.M.V. have put on the market three seven-inch 16⅔ r.p.m. discs in what are described as the "Audio Book" series. These retail at 16/- each, and to give an indication of just how in its small compass holds complete readings of Washington Irving's "Rip van Winkle" and "The Legand of Sleepy Hollow". With excellent material like this, much is on each of them, we may quote IC 306, which these new records should find a ready sale, and we venture to predict that they will be listened to by young and old alike with some avidity. One could almost describe these discs as "reading made easy", or "Automation applied to Spare Time".

Explorer Satellite Uses Silicon Transistors

Cosmic ray, meteorite, and temperature information now relayed to earth from the globe-girdling Explorer satellite is being gathered with the help of many tiny silicon transistors made by Raytheon Manufacturing Company.

Extremely rugged and reliable, the pea-sized transistors are in the satellite's telemetering circuit that sends coded data to receiving stations on earth.

The transistors, Type 2N328, developed under Army Signal Corps contract, are the PNP design, made by the Raytheon-perfected fusion alloy process. This process permits a mechanically stronger assembly, allowing the transistor to withstand higher shock and vibration stress, both in the launching and orbit.

Other advantages for satellite use, in addition to the many inherent advantages of silicon transistors, are the 2N328's high electrical efficiency and ability to withstand sudden surges of voltage.

Silicon transistors have these advantages over similar germanium devices for satellite use:

The silicon devices work well at temperatures ranging from minus 50 to plus 150° Centigrade, or much higher than germanium. Likewise, silicon performs more uniformly at the predicted temperatures for which the satellite equipment was designed.

Unprecedented Output of New Fluorescent Lamps

Thanks mainly to the improved quality of fluorescent lamp powders, Philips are now able to manufacture fluorescent lamps, giving unprecedented performance regarding luminous output.

Advice has been received that the new light output of the TL 40W/33 tube is now 2,800 Lumen, representing 70 Lumen per Watt or an increase of approximately 10%.

This new light output is provisionally only for colour 33.

Visiting Electrical Engineers Honoured

Last week, Wellington electrical engineers gathered at the National Art Gallery to meet Mr T. E. Goldup, C.B.E., president of the Institution of Electrical Engineers (London), Mr W. K. Brasher, C.B.E., secretary of the institution, and Mrs Brasher, who were paying a short visit to New Zealand before returning to England via the United States of America.

Mr E. H. R. Green, engineer-in-chief of the Post Office and Mrs Green received the guests.

The occasion was something new for New Zealand electrical engineers, as this was the first visit of the two principal figures in Commonwealth electrical engineering circles to New Zealand.

In welcome, Mr Green said that all those present felt privileged to meet Mr Goldup and Mr Brasher, and he hoped that the visitors had found their brief stay a pleasant one.

In reply, Mr Goldup commented on the spontaneous nature of the welcome and the opportunity of meeting so many New Zealand engineers and their wives, and so many senior members of the profession already known to him. He mentioned the part electrical engineers had played in world development, and the part they must play in the future. He reminded the younger engineers particularly that in their hands were vast powers for building that which was good. In their hands, too, was knowledge of the means of destruction, but he was well aware that the knowledge possessed and being acquired by engineers and scientists in the Empire today aimed at the betterment of man's lot.

To the president's reponse, Mr Brasher added his own appreciation of the welcome, and reminded the younger members of the need to develop to the greatest possible extent, a lively interest in local institution activities and to have a voice in all that was going on around them.

Among those present were Mr and Mrs F. T. M. Kissel, Mr and Mrs R. J. Fyfe, Mr and Mrs G. R. Milne, Mr and Mrs R. S. Maunder, Mr and Mrs E. B. Mackenzie, Colonel and Mrs S. B. Wallace, Mr and Mrs W. M. B. Veitch, Mr and Mrs W. L. Harrison, Mr and Mrs J. K. Horn, Mr and Mrs J. Hassant-Lee, Mr and Mrs J. K. Hooker, Mr and Mrs A. R. Blakeley, Mr and Mrs A. C. Callender, Mr and Mrs S. A. Vincze, Mr and Mrs E. H. Hitchcock, Mr and Mrs E. Walpole, Mr and Mrs J. O. Renaut, Mr and Mrs W. R. Crocker, Sir Ernest Marsden, Professor MacElwee, and Messrs M. Cable, A. A. Bollons, C. L. Turner-Williams, T. R. Clarkson, L. F. Withers, G. Searle, H. M. Cotton, F. H. Fitt, K. J. Salmon, and C. W. Heyward.

NEW ZEALAND RADIO AND ELECTRICAL TRADERS' FEDERATION REVIEWS EFFECTS OF IMPORT CONTROL

The following schedule is a survey made by a panel of members of the Federation for the benefit of all Federation members. We have much pleasure, as the official organ of the Federation, in printing this list, which we are sure the trade as a whole will find most timely and useful.

Introductory Note

The compilers of this schedule have asked us to indicate that the list, and the information contained therein, is not in any way to be taken as official. It is realized that there may be certain inaccuracies, but these are inevitable, as the panel which compiled it had to work at high speed, relying on their memories and their pooled knowledge of the situation. It is felt, however, that a list such as this should be of great assistance to most readers, who have already found considerable difficulty in placing the correct interpretations on the official schedules, which are difficult to decipher for anyone who has not had to use them for actual importing operations. Estimates of stocks available have been made by a perusal of the official schedule, with consideration given also to stocks at present in the country.

NEW ZEALAND RADIO AND ELECTRICAL TRADERS' FEDERATION

IMPORT CONTROL, 1958

The following schedule is a survey made by a panel of trade members for the benefit and guidance of member of our federation. The survey does not purport to be an official survey as it represents an opinion only of the effect import control will have on goods available from overseas to traders. Estimates of stocks available have been made at a perusal of the official schedule with consideration given also to stocks at present in the country.

1. Amplifiers:

25% reduction on 1956 imports. Importations plus stocks plus intended local manufacture should be able to cope with demand.

2. Batteries:

(a) Hearing aid, no reduction.

(b) Car batteries made in New Zealand, no difficulty with stocks.

(c) All others locally manufactured product only. All importations prohibited.

(d) Battery chargers locally manufactured. No imports any time.

3. Cabinets, Includes Speaker Cabinets:

No imports any description. Locally manufactured sufficient for requirements.

4. Clocks:

Cut by 75%. Estimated stocks reasonable. Shortage possible later in the year.

5. Cooking and Heating Appliances, Includes Kettles, Heaters, Frypans, Coffee Percolators, Jugs, etc.:

Restricted imports by persons previously holding licences, but now only on token basis. Result early shortage. However, local production will assist in maintaining most lines.

6. Dishwashers, Includes Domestic Clothes Washing Machines:

No imports, but local product will be available in slightly smaller quantities.

7. Food Mixers and Liquidizers:

See 5.

8. Fans Cut 75%:

Stocks low because of end of season. Present indications are stocks will be low for next summer.

9. Fuses:

(a) Car types, stocks reasonable cut 25%, depending on which tariff item they are imported under.

(b) Other types based on 1958 licences held. This means that there should not be any great reduction from previous years.

10. Floor Polishers:

Cut 75%. It is anticipated that a shortage will soon show itself.

11. Electric Irons:

Cut 75%. It is anticipated that the increased local production will be able to cope with requirements.

12. Knitting Machines, All Types:

Token licences only will be issued. Likely to be very short very soon.

13. Lamps:

(a) *General Household Types (Made in New Zealand) Fluorescent Units complete, Lampshades, Bedlamps, Table Reading, etc.*:

Imports prohibited. Present stocks and local manufacture household types should cover market as previously, present stocks lamps, bed reading, etc. and imported shades etc. low and will be short early this year. Some local manufactured shades in metal, glass, and parchment, etc. will assist to cover requirements. Variety will be lacking.

(b) *Vehicle and Dial Lamps*:

25% reduction. Present stocks and stocks coming forward should hold for some months yet.

(c) *Tube Lights architectural and special types*:

Cut 75%. Slight shortage will be felt towards middle of year. Severe shortage towards end of year unless local manufacturer makes fluorescent tubes, which seems most unlikely.

14. Motors, Electric:

Cut 25%. Present stocks good. No real shortage anticipated.

15. Musical Instruments:

Token licences only. This does not include band instruments, for which special applications are considered. Shortages are already apparent in some lines, notably accordions, and dealers will be faced with allocations from their suppliers very soon.

16. Musical Instruments' Strings:

Metal or gut, no restriction.

17. Machine Tools:

Home workshop equipment, etc., cut 50% Present stocks and goods to arrive would appear to cover most of the market for some time to come.

18. Pianos:

Cut 75%. From our information stocks are not good and even though shipments still arrive, these are mostly sold already.

19. Plugs, Sockets, and Outlets:

Imports prohibited as before. Locally made and should present no difficulty.

20. Plugs, wall type, and Boxes, etc., includes metal clad:

Token licences only, but indications are stocks will last for reasonable time.

21. Radio Telephones:

These have always been prohibited and still are. Local manufacture supplies market adequately.

22. Refrigerators:

Ditto 21.

23. Radio Sets from Overseas:

Ditto 21.

24. Radio Parts:

(a) Includes vales, valve sockets, plugs, and sockets other than N.Z. 3-pin flat, vibrators, car aerials, microphones, connectors, and stand resistors, knobs, volume controls, reduction 25%. Present stocks should, together with future timportations, not materially effec dealers.

(b) Spaghetti, Hellerman sleeves, reduction 50%. Stocks should last, together with future importations, until towards end of year.

(c) Transistors, condensers, transformers, chokes, etc. These items are restricted and individual applications will be considered for the first two items from importers who previously imported these lines. The latter items are always restricted to special types not manufactured in New Zealand. Local requirements for transformers and chokes, etc. will be met from local production as before.

(d) Expanded metal not restricted.

(e) Speakers, 25% reduction on types under 3 in. and over 12 in. No licences granted for general purpose speakers as they are made locally.

(f) R.F. coils and shields. The former are restricted as they are locally made with the exception of special types for which token licences will be granted. Shields and shield bases are covered by "a".

25. Records and Recording Tape:

Restricted. Token licences only granted for tape. Records will have to be met by local manufacture with the exception of special types previously imported and not pressed here. No pre-recorded tapes for sale will be available unless made locally.

26. Record Playing Equipment, includes Gramophones, Changers, Players, Record Playing Amplifiers, and Cartridges:

Token licences only will be issued. Present stocks very low indeed and shortage already apparent. Dealers should not expected to obtain quantities of these items

in the near future. It is intended that some local manufacturers will make record players. Token licences only expected for changers and players.

27. Razors, Electric:

75% reduction. Present stocks fair. Shortage to be expected towards middle of year.

29. Styli and Needles:

Now a "C" item.

30. Sewing machines:

(a) Domestic, cut 75%. Stocks fair. Shortage apparent middle of year.

(b) Commercial. Reduction 10%. It appears that some machines in this category will be sold as domestic to cover the market.

31. Switches:

(a) Through cord, plastic flush type, surface. The first item is prohibited although not made in New Zealand and discussions are under way to have this altered. The latter are made in New Zealand and no difficulty should be experienced with local suppliers.

(b) Bell push and other types. Token licences only, but present stocks appear to be fair and no difficulty should be met for some little time.

32. Switchboards, Fuseboards, etc. Built Up. Also Circuit Breakers, Cutouts, Cable Connectors, Terminals, Lightning Arresters:

Token licences only will be issued and shortage will become apparent in connectors and terminals later in the year, other lines at varying times depending on present stocks.

33. Toasters:

See 5.

34. Test Equipment:

Cut 25%. Present stocks indicate there will be little if any shortage to meet normal requirements, except possibly over the counter sales.

35. Tools, includes Pliers, Side Cutters, Screwdrivers, etc.:

Cut 50%. No shortage is anticipated for some considerable time yet.

36. Tape Recorders, Built Up:

Restricted imports. Token licences only, and a severe shortage is anticipated. Some machines will be entered as office machines and may assist the market, see 38.

37. Tape Recorders, Decks only:

Restricted licences, severe shortage anticipated very soon, more particularly as one line in England has had to stop production to rectify a fault.

38. Tape Recorders, Office Use:

Reduction 50%. These machines come under a special category, in that they must have various requirements, such as instant stop, foot control, counter, stethoscope, earphones, etc., and very few will come under this heading. Hence, a shortage is also likely here in the very near future.

Note: The tape recorder situation is under review and an announcement will be made at an early date.

39. Vacuum Cleaners:

(a) *Domestic*: Prohibited. This means that unless another manufacturer enters the field only a few well-known makes will be available after present low stocks are exhausted.

(b) *Commercial*: The Government has decided that only a very limited number will come in this category, and therefore, owing to price, shortages will be inevitable at an early date.

40. Washing Machines:

Made in New Zealand. However, imports will be allowed against licences held for 1958, before the present restrictions took effect and a trickle of overseas machines will be admitted. Local manufacture can cope adequately with the demand.

41. Wire and Cables:

(a) Hookup includes microphone, etc. Prohibited import.

(b) Winding includes coaxial and general house winding, etc. Normal stocks and imports as before reduction 10%.

(c) Insulated special types, mainly aircraft, etc. Special licences will be issued and trade generally will not be affected as it concerns mainly Government works, etc.

Severe anomalies could influence a change of Government policy. Also, as the panel cannot forsee Government policy, some of these comments may be altered in the course of time when we shall again let you have the necessary information.

On going to press, we are informed that both U.S.A. and Japan are being treated in the same manner as other countries as far as imports are concerned previously from these countries, and more information will be published on this as it becomes available.

Also, we are informed that as soon as all basic licences have been issued, applications will be considered for spare parts for appliances, etc. and there would appear to be no difficulty in the issue of these.

We feel that by bringing to your notice the above comments that you will be better able to assess your trading position during the coming year and help you to understand the difficulties faced by your suppliers in giving you the service and the goods which makes our trade possible.

MISSING AND STOLEN RADIOS

Auckland:

Mullard bedside radio, cream bakelite case, serial number not known, small chrome screw missing near dial. Value £7 10s.

Philips transistorized, all-wave portable, "Town & Country", model No. 465. Cream plastic case with gold-coloured trimmings, red cloth behind speaker grille, five red push-button controls, slide-rule type of dial. Red plastic handle on top of case. Battery operated on one type 467 and eight type 950 batteries. Finish number 112322. Serial No. 4106.

Philips mantel radio, five-valve broadcast. Dark brown plastic case about 15 in. x 10 in. x 6 in., oblong-shaped dial face, two white knobs. Serial number not known. Value £10.

Christchurch:

Bell 12-volt, 3-valve car radio, painted brown. Serial No. 55923. Value £32 10s.

Philco 11-valve, 5-band spread, short-wave radio, model No. 1051. Serial No. 57082. Not contained in a cabinet. Value £80.

Pacemaker, 5-valve broadcast, white plastic. Two tuning knobs, oblong dial. Value £14 10s.

Collaro automatic changer, three-speed player. Value £13 19s. 6d.

Radio in wooden cabinet 14 in. x 10 in., dark oak, round dial, 3 knobs on front, 6-valve, broadcast model, about 10 years old. Fitted with 5 ft white flex with double adapter. Value £5.

Feilding:

Zenith mantel radio, in wooden cabinet 16 in. x 20 in., large round dial in centre of radio with sweeping hand. Three small scratches on wood round dial, one with letter "P" above it indicating the Palmerston North station and the other two indicating the Wellington stations. Four push-buttons under dial in dark brown colour. Serial No. nto known.

Invercargill:

Pacemaker transistor set radio, 12 in. x 9 in. x 3 in., varnished with copper-type grille on front, grille dented. Serial No. 69409. Value £38.

Philips car radio, automatic. Model 656, set No. 16735. Chrome silver colour, speaker black. Value £27.

Lower Hutt:

One tuning half of CR8U5 Clipper car radio, 12 volt, minus power pack. Mottled grey paint finish, 8 in. x 2 in., containing tuning dial, two knobs, one missing. Serial No. will be one of the following: 57346, 79796, 76738, 75214.

Morrinsville:

Philips 4-valve car radio. Grey colour. Serial No. 4048/188219.

Motueka:

Autocrat, push-button 8-valve transistorized. Comprises of a box about 2½ in. x 10 in. x 8 in. Mottled grey colour with chrome front where the push buttons are. Serial No. 43081. Value £32.

Murchison:

Moto Rola car radio, six valve, six volts. Blue-grey colour. Serial No. 1793. Identifiable. Value £30.

Nelson:

Pacemaker portable, red and cream in colour. Fitted with cream flex, black three-pin plug. As front opens, radio automatically switches on. Serial No. not known. Value £35.

Ngongotaha:

Pye 5-valve radio, contained in a dark stained wood cabinet. Size 18 in. x 12 in. Number 48687.

Opunake:

Columbus mantel model radio, 5 valve. Plastic casing, grey colour, flex attached but no plug new condition. Number 71262. Value £19 19s.

Pahiatua:

Philips model 465, transistor portable radio in a white plastic case with red trimmings. Numbers 4176 and 120374.

Petone:

Clipper shoulder-bag portable radio. Serial No. 110705. The radio is contained in a brown leather case with shoulder-strap, measuring 10 in. x 7 in. x 3 in. Radio is cream in colour with the "Clipper" in red. The radio in side case is contained in a clear plastic bag. Value £19 15s.

Pacemaker portable radio, light oak case with gold beading, about 9 in. x 12 in. Serial number 68845. Value £37 10s.

Pukekohe:

Pacific 6-valve portable radio, black with silver grid on front. Small chip off top of black marking line right side of dial. Round ring with three stars inside on top right side of grill. Serial number not known. Identifiable. Value £20.

Putaruru:

Autocrat car radio for 12-volt system, 5 valve. Painted cream. Serial number 32195 and identifiable. Value £27.

Taupo:

Autocrat car radio. Serial No. 423393. Printed steel grey with separate speaker also painted steel grey. Model is a push-button tuning transistor type. New condition.

John Gray

JOHN GRAY'S RECORD PAGE

RECORD OF THE MONTH

Bartok: Concerto for Orchestra. Berlin Radio Symphony Orchestra, conducted by Ferenc Fricsay. Deutsche-Grammophon DGM or LPM 18377 (12-inch LP).

This is the latest issue of a major work which has been consistently lucky in the matter of recordings (only the earliest Decca set, a transfer from 78, was really disappointing). I am not aware to what extent the new disc is readily available and, for reasons outlined below, intending purchasers should not delay. Bartok's work, only fifteen years old, has by now almost established itself as a standard classic and before these words are printed it will have had its first public performance in New Zealand. It was one of the composer's last and is on a huge scale: and is called a concerto because practically every instrument has at some time a pprominent solo passage calling for considerable virtuosity. Although there is, in the first and third movements, much of Bartok's rather forbidding brand of seriousness, the alternating movements are light, whimsical, and graceful, and the finale brings a tremendously exhilarating riot. No praise seems too high for this performance by a crack orchestra and a conductor who is himself of Hungarian birth. Deutsche-Grammophon are at their best in reproducing complicated scores and surely no previously issued record has yielded up so much of what is in this one. Bartok admirers will need no special urging, and those who have yet remained lukewarm to the composer's music may be encouraged by the fact that this is by now unquestionably his most popular work with the general musical public. The recording itself seems well nigh flawless.

THE FOURTH SPEED

For some time now we have known that two further developments in the endless evolution of the gramophone record have been just around the corner. One is the stereophonic disc, the other the new speed of 16 ⅔ r.p.m. When this speed was first mooted hardly anyone believed it would be practicable for anything but speech, and sure enough the first local releases (from H.M.V.) are of the "talking book" variety. But in America the Vox company have pioneered serious music—one such disc contains Tchaikovsky's "Romeo and Juliet" overture, sixth symphony and first piano concerto within its compass! No news is available as to when such marathons will be offered to the public here, but the "Audio Books" are at least a beginning. The discs are of the 7-inch size. On IC 305 are "Rip Van Winkle" and "The Story of Sleepy Hollow", IC 306 has "The King of the Golden River" and "The Great Stone Face", while on IC 308 are two lengthy extracts from "Gulliver's Travels". All these works have been "edited for young people by Elinor Gene Hoffman". The sponsors point out that these discs can, in effect, be played only on machines fitted with the "fourth speed". This notice seems rather to stress the obvious, though it happens that an adaptor to convert any 33⅓ turntable to the lower speed is in existence, but owing to import restrictions it cannot be imported. Hence, in the meantime, only those who have purchased the latest type of turnable will be able to accommodate the new discs. I have not seen one in action, but the slowness of he revolutions is, I am told, quite uncanny to watch. As for the stereo disc, a leading English company hopes to market these before the end of the year. This, however, should not at present deter us from buying such of the current type of LP as can still be procured.

WHERE DO WE GO FROM HERE?

The recent restriction of imports has caused much buzzing in gramophonic circles and there has already been some angry clucking from interested parties. If there is to be a complete "shutdown" there is not much any of us can do about it: meanwhile I observe shop after shop with shelves loaded with LPs and would suggest that the fans could do worse than investigate some of the treasures which have been piling up over these last few years. Broadly speaking, it looks as though we may in future be restricted to what can actually be pressed here or, to be more precise, to what the companies decide they iwll press. From that point of view the law of supply and demand, coupled with the matter of sheer economic necessity, may mean that the connoisseur will have rather a thin time of it. Some of the more important agencies lack their own pressing facilities and to them we must all extend sympathy—I hear, for example, that we may have seen the last, for a time, of Deutsche-Grammophon and one or two other important labels. Possibly this also goes for the Cook "Sounds of our Times" series, much in demand in hi-fi circles, and of which a further release is made as I write. Among the more interesting of these are some flamenco records by the guitarist Carlos Montoya, of which Cook 1029, covering a very wide range of mood, is cordially recommended. Beautiful sounds emanate from disc 1030, which is a harp recital by the accomplished Edward Vito—"Clair de lune", in particular, can rarely have sounded so magical. I am not enamoured of mammoth pipe organs but Reginald Foort's discs on this label are well worth the attention of those who are: perhaps Cook 1050, with its old favourites like "In a Persian Market", the "Zampa" Overture, and an improvization on "The Bells of St. Mary", would be as good a choice as any.

ITEMS OF TOPICAL INTEREST

With the "season" now getting into its stride, the record lists are offering us permanent reminders of some of this year's visitors in the musical and entertainment worlds. There is Emlyn Williams, who for the last few years has carved out a niche for himself as a travelling reader of passages from Dickens—a form of entertainment which one thought had died out half a century ago!, and the many who flock to hear him will be interested in two Decca 12-

"R. & E.'s" HIT PARADE LIST

We are indebted to the publishers of "Musical Express" for the lists below, which we hope will be of considerable assistance to dealers as a guide for their "pop" record buying.—Ed.

WEEK ENDING APRIL 12, 1958

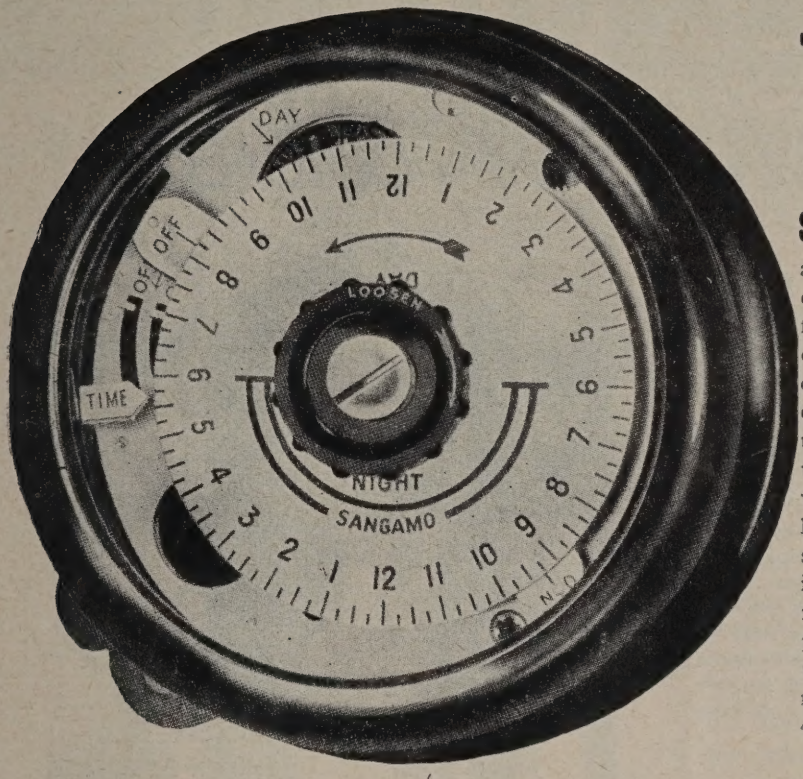
	Title	Artist	Position last week	Record Make
1	Magic Moments	Perry Coma	1	R.C.A.
2	Whole Lotta Woman	Marvin Rainwater	2	M.G.M.
3	Maybe Baby	The Crickets	5	Coral
4	Swinging Shepherd Blues	Ted Heath	7	Decca
5	Nairobi	Tommy Steele	3	Decca
6	A Wonderful Time Up There	Pat Boone	15	London
7	Teguila	The Champs	9	London
8	La Dee Dah	Jackie Dennis	4	Decca
9	Don't	Elvis Presley	6	R.C.A.
10	Catch a Falling Star	Perry Como	11	R.C.A.
11	It's Too Soon to Know	Pat Boone	13	London
12	Mandy	Eddie Calvert	16	Columbia
13	Who's Sorry Now	Connie Francis	10	M.G.M.
14	The Story of My Life	Michael Holliday	8	Columbia
15	Breathless	Jerry Lee Lewis	24	London
16	Good Golly, Miss Molly	Little Richard	12	London
17	April Love	Pat Boone	21	London
18	To Be Loved	Malcolm Vaughan	17	H.M.V.
19	Oh, Oh, I'm Falling in Love Again	Jimmie Rodgers	19	Columbia
20	Jailhouse Rock	Elvis Presley	14	R.C.A.

inch records (LXT 5295-6) containing generous portions of material, and not necessarily from the more obvious sources. On the first disc are excerpts from "Our Mutual Friend" and "Dombey and Son", as well as Bob Sawyer's party from "Pickwick". The second includes one of the best of all ghost stories, "The Signalman". Both these records would be ideal home entertainment for the coming winter nights. Inia te Wiata, the Maori bass who has at last returned for a visit to his homeland, has made comparatively few records, but there is a Nixa LP of standard ballads (NLPY 915) which it is worth while seeking around the shops. The H.M.V. organization have put out quite a list of Patrick O'Hagan single 45s which cover most of the more popular numbers in that engaging singer's repertoire. Ida Haendel, the distinguished violinist, has recorded consistently for a number of years and her account of the Brahms Concerto, on H.M.V. CLP 1032, is worth its modest price though there is formidable competition from rival executants on this and many other labels. Of the various "Pajama Game" issues I suppose there will be keenest interest in the film soundtrack—this features Doris Day (Coronet KLL 562) and demand will undoubtedly increase considerably when the film itself it released, which should be not too long after the stage version has gone the rounds. H.M.V. of course have their recording of the London production which is available on CLP 1062. Lastly in the "topical interest" department there is a record by Edouard van Remoortel, the young Belgian conductor who, at the relatively early age of 31, has just been appointed permanent conductor of a major American orchestra—the St. Louis Symphony. Van Remoortel will conduct a few concerts in New Zealand in August. Meanwhile Vox have brought out a record (PL 9840) whereon he directs the Bamberg Symphony Orchestra in a generous selection of Grieg music. Vox have never believed in short measure and the purchasers of this LP will obtain the Holberg Suite, Lyric Suite, and Norwegian Dances, with an orchestral version of the popular "Wedding Day" thrown in for extra good measure.

MAORI MUSIC FORM PAST AND PRESENT

Columbia have always had a goldmine in their famed Rotorua Maori Choir records. Recently revived from the original 78s, they have been repressed, both in their original form and on two ten-inch LPs. Now a 12-inch record (33MSX 6006) offers a selection on one side with, on the other, some of the recordings made much more recently by the Aotearoa Maori Entertainers. It is interesting to know that this same disc has been released in the United States as a Capitol record, and will no doubt have been hailed there as an exotic novelty. There should be the expecetd good sales for it here, as well. Another record of local interest, and one to cater for the large public interested in band music, is H.M.V.'s release of the Wellington Citadel Band of the Salavation Army (MDLP 6036), who, under the direction of Bruce Parkinson, perform a group of standard items, marches, hyms, a cornet duet, and the well-known minuet from Handel's "Berenice". More and more records are being made of New Zealand performers and provided the standard is kept as high as possible, this is a move to be cordially welcomed.

SANGAMO WESTON



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MODEL S279—1 pole, 1 throw, 5 amp. A short-interval switch similar to Model S277, but with contacts that "break" a circuit for a pre-set period.

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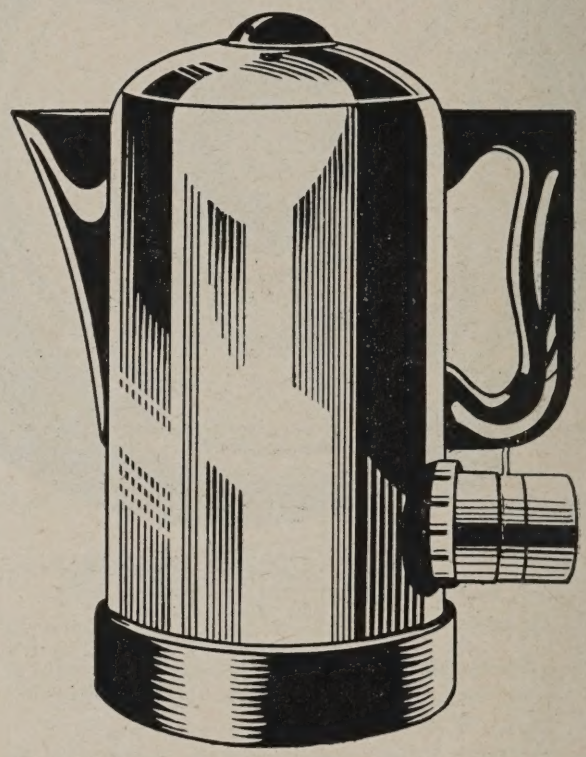

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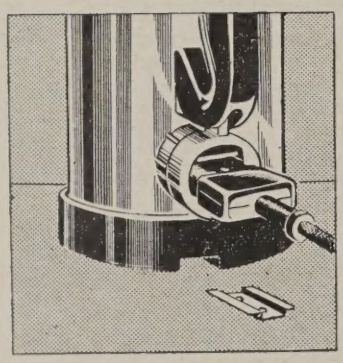

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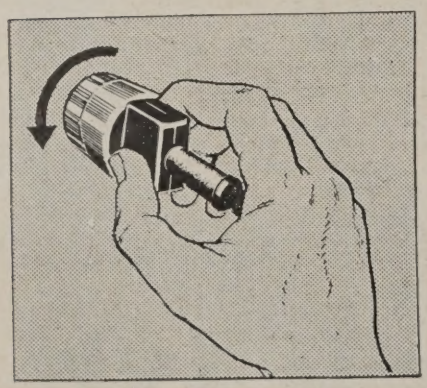

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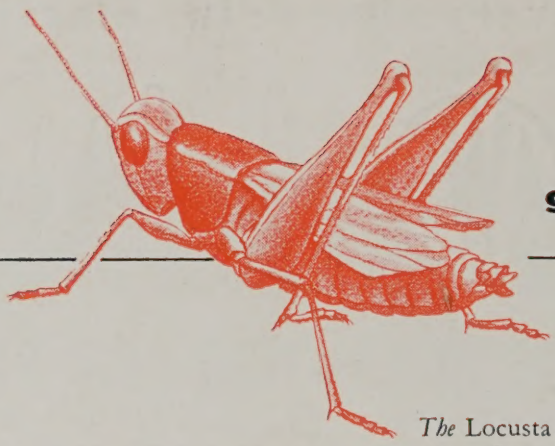

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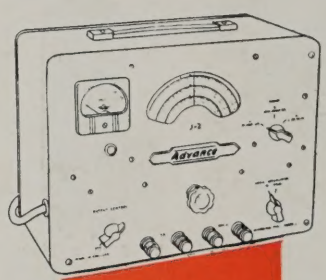

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